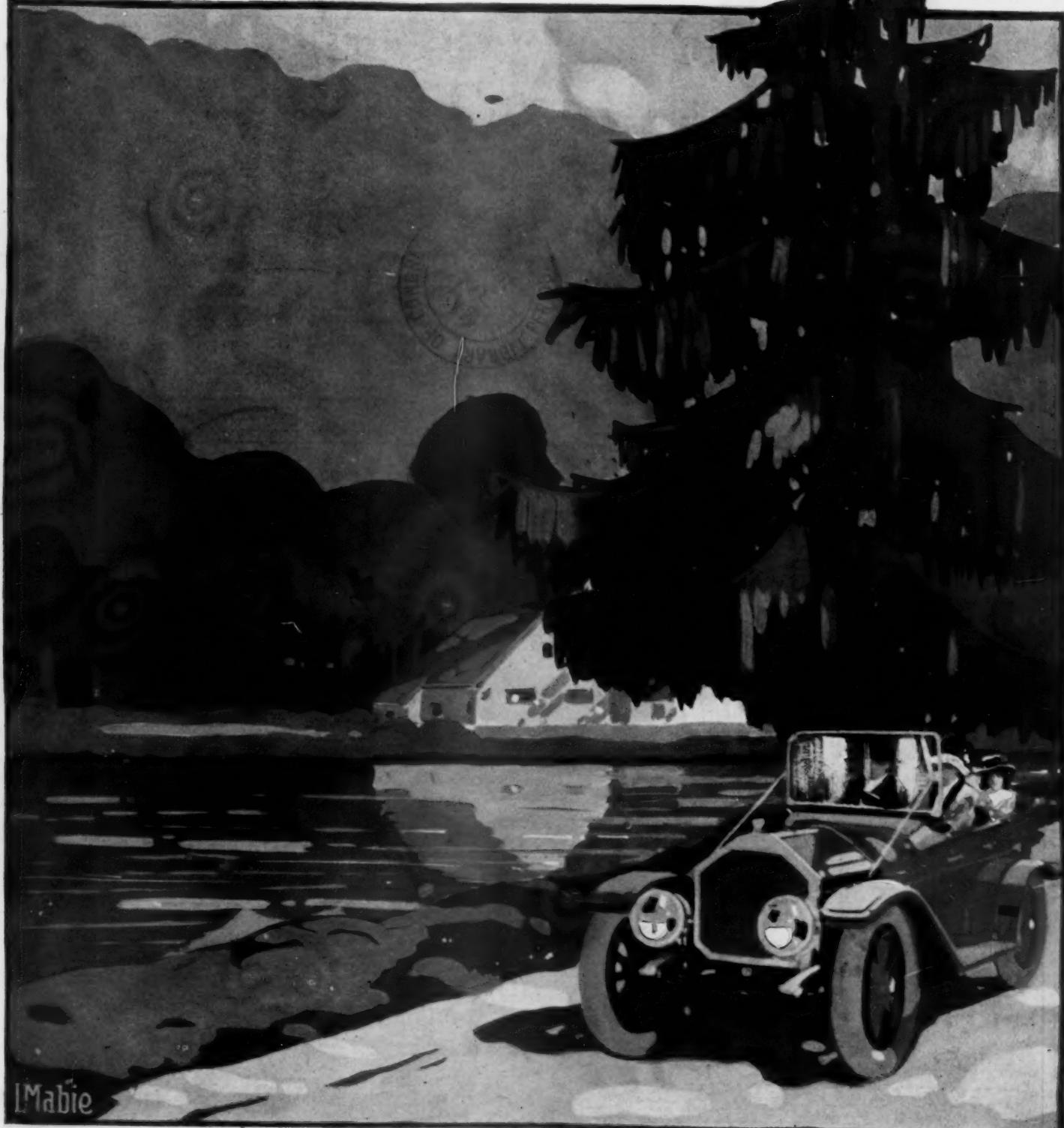


MOTOR AGE

MAY 8, 1913

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LMabie

From Ocean to Ocean and Back Again

The name MOON has become synonymous with honest construction in motor cars—it's selling lots of cars for MOON dealers.

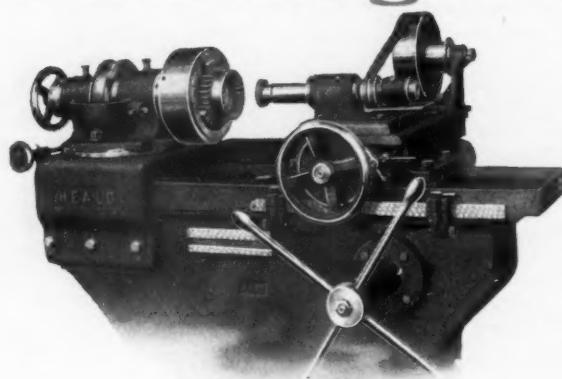
MOON MOTOR CAR CO.

Saint Louis

Moon 39 Completely
Equipped \$1,650

Moon 48 Completely
Equipped \$1,985

Modern Grinding Methods Require
Heald Grinding Machines

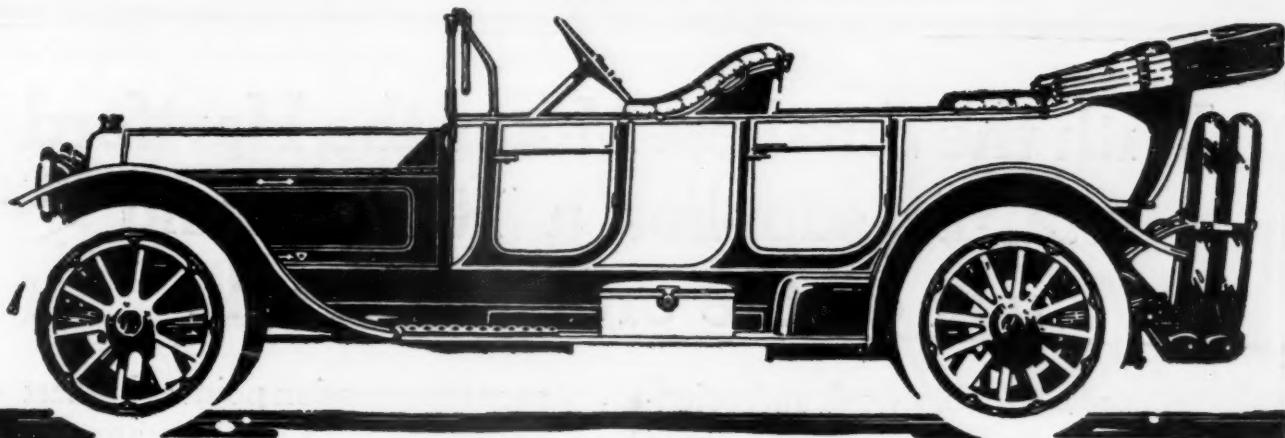


You wouldn't think of polishing a piano with emery—nor would you try to shave with a jack-knife! Simply a case of the wrong tools for the purpose. Now when you think about Grinding as a finishing method, be sure you find out the right machine for the work.

Heald Grinding Machines

have proved the most productive—the most accurate—the most economical in every way. We invite correspondence from manufacturers whose work requires the economical production of accurately round and straight holes—or taper holes. We have probably solved your problem a dozen times—and can give you definite facts and figures about it. At least, we want a chance.

THE HEALD MACHINE CO., 26 New Bond St., Worcester, Mass.



"48-Six" Seven-Passenger Touring — \$5000

PEERLESS NEW MODELS

Again First in Beauty and Safety

THROUGH the development of details these Peerless New Models reach the highest point yet attained in motor car construction.

Absolute confidence in the Peerless is evinced by the large booking of orders even before the first of the new models was ready for demonstration.

The outward beauty of the Peerless New Models is an expression of their inward fitness—of years of research and critical appreciation maturing into the perfect car.

The inside quality of a piece of steel—as well as its size—determines its strength, and your safety. Heat treatment, a vital science developed in the Peerless Plant to a point that exceeds the resources of the universities, is the controlling factor that fixes for good the durability of a gear, the strength of a shaft, the resiliency of a spring, the life of a bearing.

Three Sixes

To meet the power ranges proper to a car of the Peerless type we offer three six-cylinder models: "38-Six," "48-Six" and "60-Six."

Long Stroke Motor

The cylinder dimensions of the "38-Six," "48-Six" and "60-Six" are respectively $4 \times 5\frac{1}{2}$; $4\frac{1}{2} \times 6$; and 5×7 inches. The long stroke Peerless motor is known for its silent, vibrationless operation and its unusual power, flexibility and smooth action at low speeds.

Peerless Bodies

Body lines are unequalled in beauty. No obstruction of mechanism is evident anywhere. Chair seats in the tonneau fold out of sight. Extra tires are carried in the rear.

Chassis Models, Body Types, Prices

	Touring	Torpedo	Limousine	Landaulet	Berline-Limousine
"38-Six"	\$4300	\$4300	\$5300	\$5400	\$5500
"48-Six"	\$5000	\$5000	\$6000	\$6100	\$6200
"60-Six"	\$6000	\$6000	\$7000	\$7100	\$7200
"38-Six" Roadster	\$4300				"38-Six" Coupe \$5000

Electric Starting and Easy Steering

The Peerless was the first high quality motor car to adopt the electric starter with separate electric motor. Pressure on a pedal starts the engine. The steering column is irreversible. It is almost as easy to drive a Peerless Car over rough roads as over smooth roads.

Heat Treated Steels

Rigid selection and inspection of steels and specific modes of heat treatment insure the highest development of physical qualities required in each vital part. Wearproof gears, with tough cores and glass-hard tooth surfaces are produced with scientific accuracy.

The Peerless Motor Car Company, Cleveland, Ohio

Dealers also of Peerless Trucks

Peerless
ALL
THAT THE
NAME IMPLIES

With the Smallest Motor the Hartford Starter supplies a 1000 pound pull on the ordinary crank.

Years of laboratory work and scientific research have resulted in the perfection of an electric starter that never fails to instantly start the largest automobile engine in the face of zero weather, highest compression, rust or congealed oil.

This is the Hartford Starter and it has a starting torque 5 to 10 times greater than that of any other built. It is approximately equal to a 1000 pound pull on the ordinary starting crank.

To develop the starting torque of the Hartford from a direct connected motor would require a motor of 50 H.P. with a battery equipment of 1000 pounds.

The Hartford Starter employs a fly-wheel on the armature shaft. This wheel acts as a secondary storage battery. All excess current not immediately used is stored in this wheel and released to do most of the work when the real loads (the compression points) are reached. Takes motor

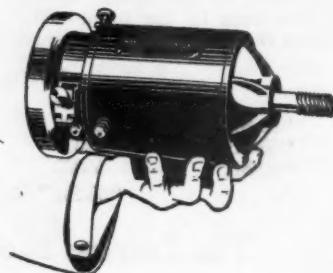
over compression point at highest speed and with smallest amount of current.

Electric starters have not been on the market long enough to warrant the claim of any manufacturer for the *standard* starter. The Hartford Starter, however, is not only the smallest, lightest, most powerful and most economical built, but it possesses features that place it years ahead of any other starter.

Your ultimate choice will be the starter that becomes standard. That means the Hartford. Why not enjoy 100% starter satisfaction now?

Send for Catalogue.

Hartford Electric Starter



Every Buyer Should Specify the Hartford Starter for His Car

HARTFORD SUSPENSION CO.

EDW. V. HARTFORD, Pres.

Office and Works: Jersey City, N. J. Dealers Everywhere. Offices in all Principal Cities

Makers of the Truffault-Hartford Shock Absorbers



Volume XXIII

MAY 8, 1913

No. 19

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Will Your Starter Work Next Winter?

Most any electric starter will start a car in nice weather—with everything in its favor.

But just wait till a cold day comes.

Wait till the first frosty morning when your engine is cold and dead; and the oil is stiff and gummy.

You press the starter button.

Perhaps your car starts and perhaps it doesn't.

If it doesn't start, listen a moment. You'll note a feeble "c-h-urn, c-h-urn, c-h-u-u-g, c-h-u-u-g" of your engine. That shows that your electric starter is turning the engine over very **slowly**—altogether **too** slowly to do business under adverse weather conditions.

But there won't be any of that slow "churning" noise if your starter is the electric Disco. The moment you kick your starter button there'll be a soft

humming sound and away you go. No wait, no delay.

Only the Disco Spins

Do you know any other Electric Starter that **spins** the motor?

Do you know any other that revolves an automobile engine **one hundred and fifty times per minute**?

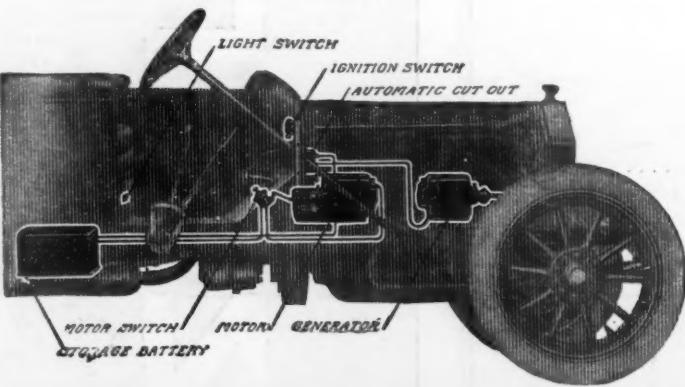
You ought to think about these things **before** you buy your car. Don't get the impression that because an automobile maker recommends certain equipment, you must accept it. Sometimes auto makers make mistakes. Sometimes their selection of equipment is based upon low price, rather than high quality.

Remember, it's your good money that pays for the car. You have a right to demand the best Electric Starter. If you don't and you discover next fall that you've got a Starter that won't stand the test of bad weather, you'll have no one but yourself to blame.

Latest Book on Starters Free

So many motorists are asking about Electric Starters that we have recently published a complete, yet exceedingly concise book. Drop us a postal and we will send you a copy, with our compliments, **by return mail**.

The Disco Company
710 Dodge Bldg., Detroit, Mich.



The ELECTRIC DISCO System STARTING—LIGHTING

MOTOR AGE



From Ocean to Ocean and Back Again

TRAVELING 9,101 miles across the continent and back in a powerful runabout; camping beside the car almost every night and under all sorts of weather conditions; enjoying every minute of the trip from Greenwich, Conn., to Los Angeles, Seattle and back again, E. D. Mead and A. N. Mead, his brother had an ideal vacation last summer. The Meads are New York business men who reside at Greenwich, and the trip last summer was not the first transcontinental tour made by them in a motor car. Back in 1909 they made the round trip, using a different route.

Many Hardships Encountered

It would be folly to say that they experienced no hardships, because 9,101 miles of miscellaneous travel across sixteen mountain ranges, numerous deserts and wildernesses, means the whole gamut of motor traveling experience. But they had a fine time; ran into no special danger and returned hard as nails and brown as berries.

Transcontinental motor trips have become so common now that they attract little notice, but the tour of the Meads was distinctly out of the ordinary and their experiences and the knowledge gained by them is of value and interest to motor-dom generally. This is peculiarly true in view of the fact that very many motorists will essay similar tours to the world's exposition in 1915 which will be held at San Francisco to celebrate the opening of the Panama canal.

Their car was a Packard runabout, rated at 30 horsepower and built in 1909. It differed from the ordinary stock car of that type only in the fact that a locker box was built on behind to carry the dunnage of the tourists and a different carburetor was substituted. The stock tires were removed

before the start and 37 by 5-inch, non-skids were substituted all around. No windshield was carried, but the regular top was much appreciated in both hot and wet weather. A tire pump actuated by the motor robbed the trip of its chiefest terror, the back-breaking inflation of tires.

The camping outfit consisted of a khaki tent with a waterproof floor. This was spread with a sectional pole and at least one of the guy-ropes was fastened to the car. All told, the tent, floor and pole weighed about 25 pounds. They carried two folding steel cots with telescoping side bars weighing less than 30 pounds; two sets of bedding and waterproof canvas bags to contain the whole outfit. There also was a complete aluminum cooking outfit; emergency rations; grate-broiler; pick, axe, shovel, block and tackle, rope, firearms, camera, etc. The whole extra equipment weighed less than 200 pounds.

Supplies Should Be Carried

A. N. Mead, who tells the story, declares they never used the cooking outfit at all or touched the emergency rations. He, nevertheless, counsels transcontinental tourists not to abandon such precautions simply because his party did not require them. He and his brother carried warm, light clothing and complete waterproof outfits.

Except for Los Angeles, Seattle, Hayes, Kan., and Thompson Falls, Mont., they camped out every night on the road, thus avoiding the horrors of some of the western hotels and gaining the advantage of the pure air.

Only three material delays were met with during the trip. The first was at Hayes, where the car was laid out for 3 days with an aggravating case of stripped gears. This resulted from a sudden shift after the car was mired down in attempt-

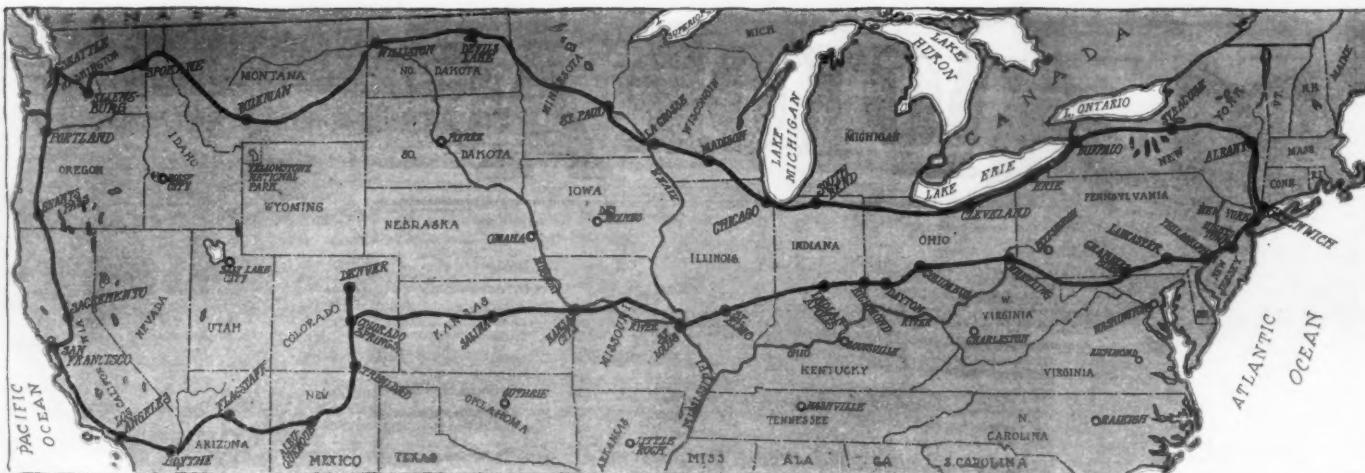
ing to cross a soft spot in the black gumbo. At Thompson Falls, Mont., on the return trip, a bed of quicksand afforded the groundwork for a repetition of the mishap. A minor accident of the same general variety occurred at the crossing of the Columbia river. All told, about 10 days were lost in this way.

Solving the Tire Problem

The Meads solved the tire problem, apparently. E. D. Mead is a careful driver and high speed was not used anywhere on the trip. That fact accounts for much of the excellent showing they made. While he was unlucky with his gears, he must have been fortunate with his tires, as one of the front tubes contained Connecticut air when the car rolled into Greenwich after the trip. They adopted this general plan: They bought six brand new 37 by 5-inch non-skids before starting and always maintained a stock of a full dozen of new inner tubes. Whenever the right rear tire showed signs of wear, they stopped at the next branch house of the manufacturer and turned in the worn tire without a blowout, receiving a new shoe and paying the mileage of the exchanged tire. They did not have to do this often, as they found their original supply sufficient except for refitting of the rear wheels at Los Angeles and Seattle and the exchange of a single tire at three other points on the way. The car fully loaded weighed just over 4,000 pounds.

They favor the plan of switching the tires from left to right and from front to rear as occasion requires.

As protection against man or beast, firearms are unnecessary, according to A. N. Mead. They had a rifle, shotgun and revolver, but they never found the slightest use for using them except when they tried a little hunting.



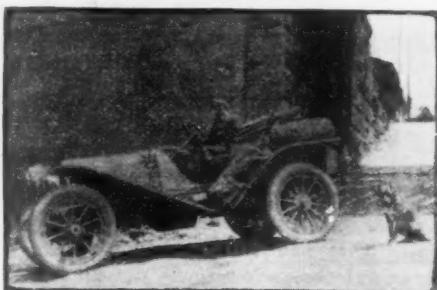
MAP SHOWING DOUBLE TRANSCONTINENTAL TRAIL FOLLOWED BY THE MEADS

One of the terrors of the desert has always been the shifting sand and its lack of traction, but the Meads learned how to conquer it. They found that where the car seemed hopelessly stalled in sand, if they deflated the tires to about 45 pounds pressure the car got traction almost instantly. With 5-inch tires, such as they used, the normal touring pressure in the tires was over 90 pounds. They had an accurate air-gauge and when one of the infrequent occasions arose where it was necessary to traverse loose sand that offered no support for the driving wheels, they let out 45 pounds of air from the rear tires and found that they had no trouble in negotiating the going. Immediately after reaching terra firma the car was stopped again and with the motor pump the released air was replaced. Running with only 45 pounds pressure would ruin a tire in a short distance, but the tourists were very careful to guard against such a contingency. In the desert they carried an extra supply of water in African water bags of about 5 gallons capacity.

Fuel and Oil Experience

On the subject of fuel and oil their experience was illuminating. They found ample fuel and lubricant everywhere it was required. The highest price paid for gasoline was 40 cents a gallon and the average was under 20 cents a gallon. The car consumed 825 gallons of gasoline and 57 gallons of oil during the trip. This is an average of 11.03 miles to the gallon of gasoline and about 160 miles to the gallon of oil.

They traveled 686 running hours and as



THE DOG AND THE CAR

The camping stops of the Meads, together with their daily running time, mileage, gasoline consumption and that of oil, as compiled by A. N. Mead, appears in the following tabulation:

Date	City	Road Condition	Miles	Hours
June 4	Greenwich, Conn.	Good	71	4
June 5	Hightstown, N. J.	Good	204	14
June 6	Marion, Pa.	Bad	109	12
June 7	Grangeville, W. Va.	Bad	131	11
June 8	Fairfield, O.	Bad and good	184	12
June 9	Richmond, Ind.	Good	245	16
June 10	St. Elmo, Ill.	Good	118	10
June 11	St. Charles, Mo.	Good	150	11
June 12	Moberly, Mo.	Good	124	11
June 13	Independence, Mo.	Good	50	3
June 14	Bonners Springs, Kan.	Good	154	11
June 15	Abilene, Kan.	Good	105	10
June 16	Russell, Kan.	Gumbo	26	2
June 17-18-19	Hayes, Kan.	Gumbo	62	3
June 20	Wakeeney, Kan.	Good	170	14
June 21	Flagler, Colo.	Good	119	7
June 22	Colorado Springs, Colo.	Good	70	4
June 23	Denver, Colo.	Good	79	4
June 24	Colorado Springs, Colo.	Good	155	12
June 25	Raton, N. M.	Good	155	14
June 26	Las Vegas	Good	124	10
June 27	Albuquerque	Good	172	14
June 28	Datil, N. M.	Good	127	12
June 29	St. Johns, Ariz.	Bad	92	10
June 30	Manila	Good	102	12
July 1	Flagstaff, Ariz.	Desert	160	12
July 2	Ash Forks	bad and good	117	13
July 3	Congress Junction	Desert	135	12
July 4	Parker	trail	40	3
July 5	Blythe Jct., Cal.	Desert	145	15
July 6	Daggett	Desert	150	8
July 7	Los Angeles	Good	250	6
July 8-14	Side trips	Good	101	14
July 15	Santa Barbara	Good	238	7
July 16	Gonzales	Good	121	11
July 17	San Francisco	Good	169	3
July 18	Red Bluff	Good	119	2
July 19-20-21	Dunsmuir	Good	151	10
July 22	Grants Pass, Ore.	Good	181	15
July 23	Albany	Bad	104	8
July 24	Portland	Good	58	14
July 25-26	Seattle, Wash.	bad	74	12
July 27	Snoqualmie Pass	Terrific grade	77	11
July 28	Ellensburg	Good and bad	20	3
July 29-30	Columbia River	Sandy and bad	147	10
July 31	Davenport	Good	20	2
August 1	Spokane	Bad	63	6
August 2	Sands Point, Ida.	Good	138	12
August 3	Hope, Mont.	Noxon mountain	132	11
August 4	Trout Creek	Bad	201	14
August 5-9	Thompson Falls	Mountains	150	12
August 10	Dixon	Bad	23	2
August 11	Phillipsburg	Good	153	13
August 12	Bozeman	Bad	158	14
August 13	Billings	Good	156	13
August 14	Miles City	Bad	168	15
August 15	Powder River	Good	223	14
August 16	Williston, N. D.	Bad	105	10
August 17	Rego	Good	190	14
August 18	Michigan	Bad	200	14
August 19	Barnsville	Bad and good	141	13
August 20	Clear Lake, Minn.	Good	204	12
August 21	Zumbrota, Minn.	Good	182	13
August 22	Reedsburg	Good	221	13
August 23	Elgin, Ill.	Good	245	14
August 24	South Bend, Ind.	Good	59	4
August 25	Clyde, O.	Good	9,101	686
August 26	Erie, Pa.	Good	141	13
August 27	Syracuse, N. Y.	Good	182	13
August 28	North Highland	Good	221	13
August 29	Greenwich, Conn.	Good	141	13
Total				141

Gasoline consumption, 825 gallons; average, 11.03 miles per gallon

Oil consumption, 57 gallons; average, 160 miles per gallon

Total running days, 71; average day's run, 128.18 miles

Average speed, 13.27 miles per hour

Total elapsed time from start to finish, 87 days

they made 9,101 miles, the average running time was 13.27 miles an hour. The longest day's run was 245 miles in 14 hours and the shortest was 20 miles, which was run in two hours.

Accompanied by their dog, they left Greenwich, Conn., June 4 about noon and ran to Hightstown, N. J., in 4 hours without accident. They camped on a hillside near the village after dinner at the local hotel, pitched their tent. At dawn they arose, packed up their dunnage and ran 40 miles before breakfast time, stopping for their morning meal at a farm house. It was growing dark when they made camp at Marion, Pa., having run 204 miles. The roads thus far were excellent. The following day they were fairly upon the Cumberland National pike, but the old road had been allowed to deteriorate in spots so that it was difficult to follow into Grangeville, W. Va. The national road improved in Ohio, having been repaired and maintained in several of the counties so that it would compare with good roads anywhere. Their route followed this road across Indiana, where they camped near Richmond, and thence to St. Elmo, Ill., and St. Charles, Mo. From St. Charles west they had good roads through Moberly and Independence, crossing the Missouri river to Bonner Springs, Kan.

Gumbo Causes Trouble

Leaving Bonner Springs, they ran into the celebrated Kansas gumbo, but the weather was good to Abilene and they had no difficulty until they approached Russell. The first mishap of the trip occurred at Hayes, Kan., about 26 miles west of Russell. The trouble arose from trying to cross a field of gumbo earth to get around a washed-out bridge. It appears that the owner of the field did not want to have the bridge replaced after a freshet last spring and went to law with the county authorities to prevent the rebuilding of the bridge. That did not help the Meads appreciably, however, when their car suddenly sank hubs deep into the gumbo, and Mr. Mead, shifting to low, stripped his gears.

Hayes, Kan., is 1½ miles back of no-

where and the tourists were obliged to put in 3 days waiting for parts to be shipped from Kansas City. Both tourists are competent motor mechanics and when the parts had been received it was a comparatively simple matter to make the replacements and bid Hayes adieu. They found accommodations at the village and while grateful, were glad to get under way again.

At Wakeeney they picked up a good road again which took them through Flagler, Colo., to Colorado Springs and Denver. They reached Denver June 23, having traveled 2,092 miles, using 191 gallons of gasoline and 13 gallons of oil in 155 hours of running.

From Denver West

The course from Denver was via Colorado Springs across the Raton pass to Raton, N. M., Las Vegas, Albuquerque, Datil, to St. John's, Ariz., the Santa Fe trail being in good condition and the progress of the car fine. On the run into Manila, Ariz., the roads were bad, being rocky, slippery and narrow, and despite the fact that they ran 10 hours during the day they only made 92 miles, when they were overtaken by darkness and obliged to pitch their camp.

The following day on the way to Flagstaff the going improved and they had an enjoyable side trip to the petrified forests and then south across about the wildest bit of desert country in the United States, but over a good trail to Ash Forks. From there to the California line the trails were anywhere from good to bad, with much sand and the hottest sunshine on earth.

Their method of procedure across this part of the route was simple. Roads as such there were none, but they found that the inhabitants appeared to be always willing to aid them in every possible way. They were given detailed information about water holes and passable trails and by observing moderation in mileage and spending plenty of time securing information and advice from the natives, they were able to get through. From Ash Forks they struck west to Congress Junction, crossing two ranges of barren mountains; thence to Parker, in the center of desolation, from



INDIANS INTERESTED IN MOTORING

whence the course lay to Blythe Junction, well over into California. They did not emerge from the desert until after passing Daggett, but on July 7 they rolled into Los Angeles. Their mileage up to this point was 3,857, which they had made in 306 hours of traveling. The car had used 355 gallons of gasoline and 22 gallons of oil.

At Los Angeles they exchanged their driving tires for new ones on a mileage basis of adjustment. They remained in and about Los Angeles until July 15, making in the meantime a trip to Riverside and San Jacinto.

Traveling Up the Coast

The trip up the coast to Seattle stands out in the memory of the tourists as the finest section of the tour. They enjoyed almost perfect going to Santa Barbara, Gonzales, San Francisco, Red Bluff to Dunsmuir in the foothills of Mt. Shasta. They spent 3 days prospecting along the McLeod river, visiting the government's fish hatchery and other attractions of that section. They also served as good Samaritans to a motor party of flour drummers who met with a mishap. The flour men were driving their car along a trail that hung on the side of a canyon and a blown tire all but shot the car into the chasm, 1,000 feet below. The Mead party, happening along at the right time, was able to lend the drummers a helping hand by hooking their block and tackle to the endangered car and allowing the Packard to yank it back out of the danger.

Skirting the Siskiyou highlands, the



TYPICAL SMALL TOWN IN ARIZONA

A STOP AT THOMPSON FALLS, MONT.



FERRYING THE CAR ACROSS A WESTERN RIVER

Meads found good roads across the Oregon state line through Grant's pass, but nearing Albany the way became rough and difficult. The run into Portland was delightful in every way.

Crossing the Columbia

Crossing the Columbia the run of July 24 was one of the most wonderful of the trip. The road enters the titanic Cascades shortly after the state of Washington is reached and meanders through Tacoma to Seattle along the cold waters of Puget sound in the shadow of the giant Rainier. The Meads were strongly impressed with this mountain, which is considered the grandest pile in continental United States. It is regularly shaped as seen from a distance, the cone rising in conventional form nearly 3 miles into the air. The whole perpendicular from tide-water to the glistening snow cap can be seen. It appears to be twice as tall as Pike's peak, because

the latter rises from a platform about 1 mile above sea level and Rainier stands all alone.

The Meads made a wide circle about the mountain and had ample opportunity to view it from every angle except southeast. They spent 2 days in Seattle and then started on the most astonishing feat of mountain climbing ever performed by amateur transcontinentalists.

Snoqualmie pass, across the precipitous Cascades, is not particularly difficult approaching from the east, but from the west it is quite different. From Seattle at sea level to the summit, 8,000 feet high, the winding road is 74 miles long. Aside from the comparatively short distance included in the city and nearby, the road is bad at its best. It is under improvement now, but when it is improved the terrific grades will still be there. Leaving Seattle the road plunges into the biggest virgin forest of the United States. Mr. Mead says that many of the giant redwoods are so old that they are dying and the pine is larger than any other he ever saw. He tells of seeing trees close to the trail that measured 16 feet in diameter and stood 250 feet high.

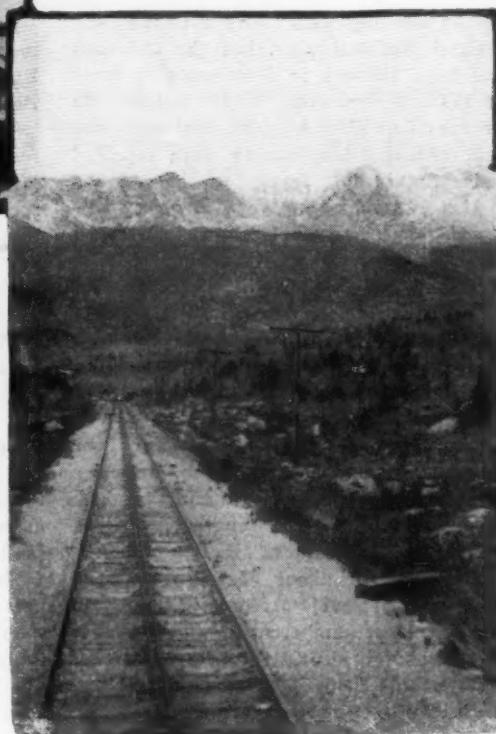
Almost Virgin Wilderness

The moist winds from the Pacific moderate the climate of the west slope of the mountains so that so far as vegetation is concerned it seems sub-tropical. In much of this section the government surveyor has not yet set his foot because travel through the forest is the next thing to impossible on account of the underbrush.

They started the actual climb about 50 miles out of Seattle. Although some of the first hills seemed like major problems in mountain scaling, they were as nothing to the ascension that followed. For 24 miles the car was in low and laboring. The last stretch of the ascent is over a

road that once was corduroyed. A corduroy road is difficult if it is new and perfect, but this one was badly out of repair. It took nearly 4 hours to run the first 50 miles out of Seattle, but it required over 8 hours of struggle to do the last 24 miles. There was one spot near the summit where it took 2 hours to make a single mile.

But at evening the Meads with their dog and car spread their tent in the summit and watched the sun dip into the Pacific beyond the western wall of the Olympics. Snoqualmie pass is approached from the east by a more equitable series of gradations but the Meads caution tour-



MOTORISTS VIEW PIKE'S PEAK

ists to tighten brake-bands at the summit before attempting the grand slide into Seattle.

Through the Wheat Country

From Snoqualmie through the great wheat country of Washington the way is not difficult. The roads are good and bad to Ellensburg and the crossing of the Columbia river. Then they are good to Davenport and Spokane and better than fair to Sands Point Id.

The grade at Snoqualmie is about the stiffest motor cars are asked to climb, but the Meads propounded a still stiffer problem to the car at Noxon, Mont. The mountain is pronounced to be the steepest in the United States that is decorated with a trail. It is long and crooked and has some wicked turns. Upon reaching the summit, A. N. Mead took two small trees and lashed them into a drag to prevent the car jumping off the cliff and landing in Canada or somewhere.

By skillful handling the descent was finally made in safety and the party made camp in an untouched wilderness. Since



SNOQUALMIE FALLS, WASHINGTON

the Meads climbed Noxon mountain the authorities have been at work and a trail is being cut around the base of the hill to eliminate the grade they had to surmount.

They climbed around among the Bitter Root hills and the main range of the Rockies in Montana, camping at Hope and Trout Creek before meeting with the most serious mishap of the tour at Thompson Falls.

Picturesque Thompson Falls

After a day spent in hill work it was found that the gears needed attention again. Thompson Falls is in a picturesque location and time did not bear heavily upon them until nearing the end of the fifth day when the repairs having been



MEETING OTHER TOURISTS



IN THE GUMBO MUD AT HAYES, KANSAS

made they started eastward on the last leg of the trip.

At the confluence of the Powder and Yellowstone rivers, 23 miles east of Miles City, they ran into a bed of quicksand that caused the Meads to take their first long walk since the start of the tour. They had to hike about 5 miles across country to find enough horse power to extricate the motor car. This was done, however, without further incident and the party entered North Dakota. They crossed the wheat lands, touching Devil's Lake and turning south cut through to the Minnesota line near Barnsville.

From there to the end there was no special incident. The route was across Minnesota, and the southwestern corner of Wisconsin to Elgin, Ill., South Bend, Ind., Clyde O., Erie, Pa., Syracuse, N. Y., North Highland, N. Y., and back to Greenwich.

In speaking of the trip A. N. Mead said: "We had a delightful time and are preparing to make our third transcontinental round trip in 1913. There is nothing like a long motor tour for rest, change of scene and relaxation and we are both great believers in the saying: See America first."

"My advice to tourists who contemplate making similar trips may be summed up briefly. The camp outfit is the key to the whole situation from our point of view. Camping is healthful; it is different from the ordinary life of the average tourist; it is more convenient and more economical. Sleep is sweeter in the open than in a stuffy little room in mid-summer.

Advice to Tourists

"We carried our camp outfit in two waterproof bags on the left running board and mudguard to balance the two spare tires carried on the right side. We found the people everywhere in the country kind, considerate and helpful. We did not have a single disagreeable experience with anybody from one end of the tour to the other.

"Motor tourists need make no special provision for fuel or oil anywhere

in the United States and prices at the highest did not seem exorbitant to us.

"Let me caution tourists to carry a sufficient supply of inner tubes. The heat in the desert in New Mexico, Arizona and California is terrific and I have seen apparently perfect inner tubes ruined in traveling a few hundred miles by actual melting of the rubber where the valve stem enters the tube.

"Where speed is more of a factor in the tour than it was with us, it might be well to ship the camping outfit to Denver by express and to use the hotels for the first 2,000 miles of the tour. We found use for our tools, block and tackle, etc., east of Denver, but the average tourist probably will find that no use whatever will be made of that part of the outfit until much further west. The rope need not be very heavy, but it should be $\frac{1}{4}$ -inch and of the greatest strength.

"By using rope of that size it will be found that much weight and bulk can be saved. On the other hand it will be just the right size for making emergency repairs such as we were obliged to make on one of our trips. We broke a spring-leaf on a run through New York state and finding a barrel standing beside the road



INSPECTING THE PETRIFIED FOREST

where we stopped to take stock of the situation, we took two of the staves, which were slightly bent to form the sides of the barrel, and bound them inside of the elliptic spring that was weakened by the broken leaf. We found that with the aid of the barrel staves and small rope we were able to continue indefinitely despite the mishap.

"I do not recommend the course we took across the Arizona desert for touring parties that include women and children, although there is nothing very trying about such a trip. A better way to cross the continent is to proceed to Ogden, Utah, by way of the Overland trail through Wyoming and then, crossing the northern arm of Great Salt lake at the Lucin cutoff, enter Nevada at Ticoma and swing south through the valley east of the Pequot and Goshute mountains and the Egan range to Ely. Turning southwest at Ely the way passes north of the Grant hills and crossing the Ruby valley climbs the Pancake range and swings south to Twin Springs. From there the trail is almost due west to Tonopah. A turn to the south, following the railroad generally, brings up at Goldfield, where another swing to the south and then west along the foothills of the Silver Peak mountains passes into California north of Lost valley, which is in reality a part of Death valley. South through the valley east of the main range of the Sierras, following the railroad through Salt Wells and the Mojave desert, finally brings up at Los Angeles. This route is not quite the one that should be used by delicate travelers, but it will prove mighty attractive to those who seek a touch of nature in one of her unusual moods.

"As a matter of fact under present conditions the best of the transcontinental routes is not boulevarded and in many spots presents a real problem to car and man.

"We found that high centers are one of the threatening dangers to motor traffic in the far west. The trails in many sections cannot be dignified with the name of roads or highways and their use in wet weather by teams has formed ruts in many places that are sufficiently deep to endanger front axles, crankcases and pans. Generally speaking, the going in such sections should be exceedingly careful if trouble is to be avoided."

WARREN PLANS NOT MATURED

Detroit, Mich., May 5—Nothing definite as to the future plans of the Warren Motor Car Co., which went into the hands of a receiver recently, has yet been decided. A statement of the condition of the company and an inventory of its stock and equipment are now being prepared, and until these are available nothing whatever can be done. It is problematical as to whether the business will be sold out or run under the receivership, according to General Manager R. W. Allen.

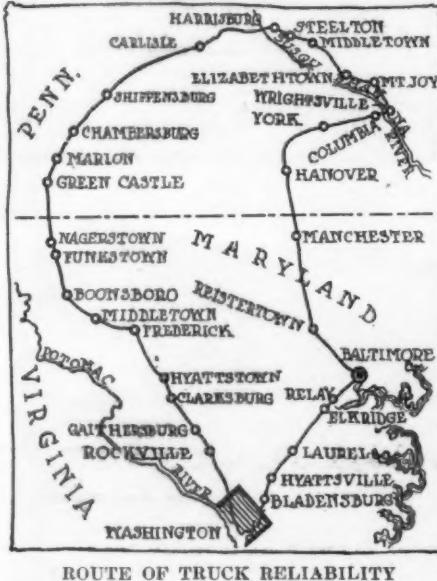
TRUCKS IN ROAD RUN

Eighteen Start in Washington Post's Reliability Test

EIGHT ARE DEMERITED

Penalties Imposed Mostly for Replenishing Radiator Water

REPORT FROM HARRISBURG



HARRISBURG, Pa., May 6—Special telegram—With 2 of the 4 days' motor truck reliability run of the Washington Post completed the score shows eight of the eighteen entrants in competing divisions to have perfect scores. They are: Mais, Wilcox, Hupmobile, McIntyre, Lauth-Juergens, two Whites and International. Three ambulances entered in non-competing divisions have observers and their score is being kept, the White being perfect. Brown has 3 points against it and the Four Wheel-Drive 15 points. Score of the other cars:

Vulcan, 189 points; Little Giant, 12; Witt-Will, 43; Rowe, 47; Autocar, 23; Atterbury, 3; Atterbury, 6; Atterbury, 101; Atterbury, 29; Atterbury, 128.

It is an interesting fact that a large number of points marked against the contesting trucks is for replenishing radiators, indicating a weakness in truck water systems.

The first day's run out of Washington was a hard test and brought out the best there was in the trucks. Middlebrook hill, 24 miles out, came near being a Waterloo for the contestants. It is an S-shaped hill with a sharp incline and soft roadbed in spots. The first few trucks ascended it without trouble, but in doing so cut up the roadbed. One car got in the soft going and in struggling to get traction cut deep in the roadway. Trucks coming up behind were unable to rush the hill and a blockade

prevailed for nearly an hour, while efforts were made to pry the trucks out of the sand. Tuesday's run of 71 miles was easy, all contestants being far ahead of schedule time into the noon control.

Government officials detailed to cover the run for various executive departments are taking numerous notes on the trucks' performances for preparation of reports to their departments. Numerous complaints are being made of rules under which contest is being run. The entry list:

No.	Car and driver	Capacity	Div.
1	Vulcan, Marshall	8,000 lbs.	8 K
2	Mais, Lewis	3,000 lbs.	4 K
3	Little Giant, Miller	2,000 lbs.	3 K
4	Witt-Will, Griffith	2,240 lbs.	4 K
5	Wilcox, Semmes	2,000 lbs.	3 K
8	Rowe, Walden	4,000 lbs.	5 K
9	Hupmobile, Kloppmeyer	800 lbs.	1 K
10	McIntyre, Smith	3,000 lbs.	4 K
11	Autocar, Althouse	3,000 lbs.	4 K
12	Lauth-Juergens, Graham	4,000 lbs.	5 K
13	Atterbury, Earl	1,500 lbs.	2 K
14	Atterbury, Kelly	2,000 lbs.	3 K
15	Atterbury, Franklin	3,000 lbs.	4 K
16	Atterbury, Shaw	4,000 lbs.	5 K
17	White, Cyphers	1,500 lbs.	2 K
18	White, Breitweiser	3,000 lbs.	4 K
19	International, Robertson	1,000 lbs.	1 K
20	Atterbury, Logan	1,500 lbs.	2 K
100	Brown, Mudd	—	• Ambulance
101	Four-Wheel-Drive, Cummins	—	• Ambulance
102	White, Judge	—	• Ambulance
A	Marmon, Foraker	Pilot	0
B	Mitchell, Leary	Pacemaker	0
C	Buick, Martin	Starters'	0
D	Stutz	Checkers	0
E	White, Coughlin	Gov't	0
F	Warren, Diller	Press	0

*Noncontesting

U. S. RUBBER CO. REPORT

New York, May 7—Special telegram—The annual report of the United States Rubber Co. and its subsidiary companies for the fiscal year ending March 31, 1913, which has been published here today, gives the total gross earnings during that period as \$91,782,861.87, the net operating profit being \$10,475,706.97 and the total income \$10,559,830.46. The net profit, after deducting interest for funded indebtedness, etc., was \$7,544,217.67.

The latter figure amounts to about 8 per cent of the net sales and from it \$5,799,955 of dividends have been paid. The surplus after these payments is \$1,744,262.67, together with moneys from the Rubber Goods Mfg. Co.'s common stock, etc. The surplus is \$11,299,129.65, which, together with previous surpluses, leaves the company a total surplus of \$28,735,736.80, out of which a common stock dividend of \$5,000,000 was paid.

Net profits exceeded dividend payments by \$1,730,755.36. Regular dividends of 8 per cent on the first preferred and 6 per cent on the second preferred stock were paid, as well as 4 per cent payments on the common during the first quarter, and 6 per cent during the last, in addition to a 20 per cent stock dividend declared in July.

During the year the first preferred issue has been increased from \$40,000,000 to \$70,000,000 and the common stock from \$25,000,000 to \$40,000,000, the second preferred having become convertible into first preferred. In addition to an enlargement of the company's plants those of the Rubber Regenerating Co. have been acquired. The Morgan & Wright plant at Detroit has

been extended to double its capacity and a new tire mill at Berlin, Can., is about completed.

The report gives the company's assets as \$185,770,827.52, of which \$105,687,667.88 is credited to property and \$7,456,804.28 to cash on hand.

STILL FIGHT TRUCK BILL

Boston, May 6—Aroused by the attempts of the highway commission to increase the tax on commercial vehicles and fighting for the retention of the present fee of \$5 for each truck, representatives of the motor industry today argued their case before the members of the committee on roads and bridges of the Massachusetts legislature.

At first willing to compromise, the motor industry now is ready to fight. Both the sellers and buyers of commercial vehicles feel that had the highway commission wished to do so, it could have been successful in having the bill, calling for a tax of \$5 on 1 ton and \$2.50 for each additional ton, passed by the legislature. Instead of working in the interests of the compromise bill, the highway commission doubled the amount of fees. This aroused the motor industry to fight any increase proposed.

The highway commission ignored today's conference and was not represented, even by one of its clerks. The committee on roads and bridges, however, showed a great deal of interest, all of the members being present at some time or other during the hearing that lasted for 3 hours.

More than fifty representatives of the motor industry were present and the speakers attacked the bill favored by the highway commission as unconstitutional, class legislation and tending to handicap the adoption of the commercial vehicle.

The committee is expected to make an early report. Meanwhile the motorists intend to keep up the fight for they would not be surprised should the committee report the same bill. The opposition then will be centered in the senate, and if that body acts favorably upon it, aggressive measures will be carried on in the house by the motorists.

TRUCK LEGISLATION BEATEN

Providence, R. I., May 5—Rhode Island has gone on record as not being ready to tax motor trucks off its roads, despite the fight waged by some of the members of the legislature and officials in that state. The state board of public roads originated the truck bill. Then it was presented to the legislature and went to the judiciary committee, where it got a favorable report. But the motor industry interests banded together and fought to the last ditch. The legislature adjourned and the bill died with adjournment. The bill would have made 5-ton trucks pay as high as \$60, and as there are more trucks per capita in Rhode Island than any other state, it would be a serious menace to the industry.

PACKARD TEST IS ON

Motor Attempting to Run 200 Hours Without Stopping

A. C. A. HANDLING TRIAL

Last Reports Tell of 48-Hour Mark Successfully Passed

NO TROUBLE EXPERIENCED

NEW YORK, May 7—Special telegram —For more than 48 hours the Packard six-cylinder 4 by 5½-inch motor, now on test at the laboratory of the Automobile Club of America, has been steadily running at the rate of 1,200 revolutions per minute.

This is a model 38 motor, taken from stock and driven in a touring chassis from Cleveland to New York. It arrived here Friday noon and at 10:43 Saturday night it was started on its long test.

For 200 hours the motor will be run at maximum power at the rate of 1,200 revolutions per minute. The throttle is wired wide open, the magneto is wired so that the spark is fully advanced. The laboratory staff works night and day in 8-hour shifts, keeping a constant record of the performance of the motor.

To all appearance the motor is running just as it did when started. A test of this kind uses 60 gallons of gasoline every 200 hours. In 1 hour the motor will have turned over 52,000 times, or 1,730,000 revolutions per day. At the end of 200 hours

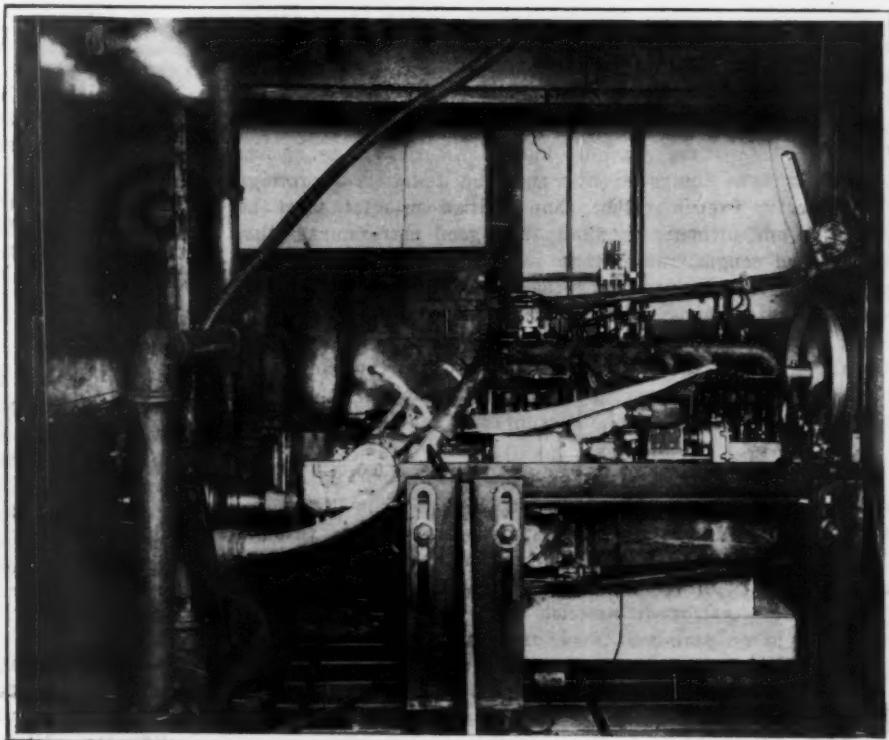
the motor will have revolved 14,000,000 times. At 1,200 revolutions per minute, with the standard gear ratio of a touring car, the car will be traveling at the rate of 37 miles an hour. This is 888 miles per day, or, for the 200 hours, amounts to 7,400 miles. Should the test be continued for 300 hours, it will correspond to a traveled distance of 11,100 miles. At the end of 300 hours the crankshaft will have revolved 21,600,000 times.

Observations are made constantly, according to the conditions printed in Motor Age May 1 and no sign of weakness has as yet developed. A blast of air to parallel road conditions is used to the crankcase and water is pumped into a cooling tank instead of thrown in the radiator.

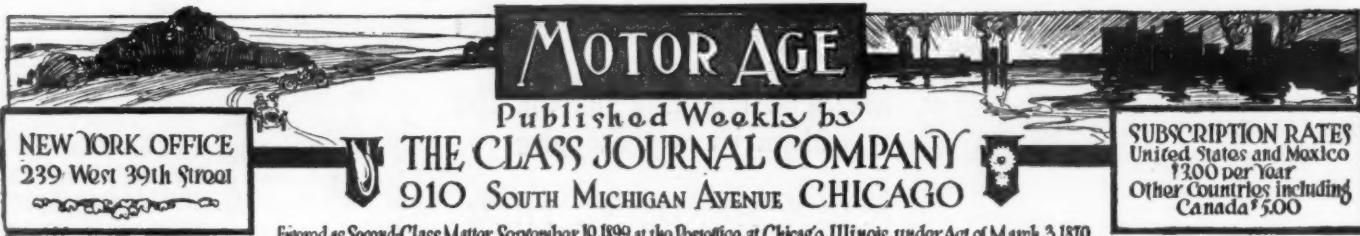
AMERICAN CYCLECAR ANNOUNCED

Indianapolis, Ind., May 6—Announcement is made of a new cyclecar to be produced in Indianapolis by the Economycar Co., the names of the incorporators of the concern not being disclosed. This is to be exhibited and demonstrated at Indianapolis during the speedway meet, and it is intended to enter it in the Indiana-to-the-coast tour in July.

The features of the car are as follows: Wheelbase, 106 inches; tread, 36 inches; tandem-seating stream-line body, 9-horse-power motor of the motorcycle type with silent-chain drive to countershaft and belt-drive to the rear wheels; wire wheels; tires, 28 by 4½ inches. The weight, fully equipped, is 393 pounds, speed 40 miles per hour. The price, it is announced, will be under \$400. This is the first cyclecar of the tandem French type which has been announced in America. A more complete announcement will be made later.



PACKARD SIX MOTOR IN A. C. A. LABORATORY TEST



Colorado's Appreciation of Motor Age

COLORADO SPRINGS, COLO.—Editor Motor Age—At the recent annual convention of the Lincoln Highway Association the members expressed their appreciation of the splendid efforts of Motor Age to attract attention to Colorado as a touring state. The thanks of the members of the association were expressed to Motor Age for the splendid publicity which it has given to Colorado and its attractions to the motorist through its many recent editorials, and particularly through the series of articles, "One Thousand Miles Through Colorado." The members of this association want Motor Age to know that they appreciate what it has done and what it is doing in this direction and that it is their desire to cooperate with Motor Age.—A. W. Henderson, secretary-treasurer Lincoln Highway Association of Colorado.

America and the Cyclecar

THE cyclecar movement abroad has proved that a reliable four-wheeled motor vehicle of fair speed capabilities seating two can be built for a fraction of the cost of present motor cars. This new type, called a cyclecar, is expected to be very soon on the roads in the hands of thousands of American drivers.

IN the spirit of the real definition of the word a cyclecar is a four-wheeled car built on motorcycle lines. The first cyclecar was built in France, had a motor cycle motor, chain-drive to countershaft, and belt-drive to the rear wheels without differential. The tread was 36 inches so it could dodge between the ruts of bad roads, and in a road race the car averaged, with two persons up, some 38 miles an hour for more than 100 miles. This race announced a real car, in performance at least, and simple in the extreme. Such a car could be produced in America by our manufacturing methods, in large quantities to sell for as low as \$300. It is probable that no cyclecar selling for over \$400 ever will be popular in America, while single-seaters, really four-wheeled motorcycles with single-cylinder motors, soon will sell for \$250, and perhaps at a smaller figure.

THESE things are possible, but if America is to accomplish these things lessons must be taken from foreign experiences. French rather than British practice must be followed, and ultimate simplicity and good performance must be the end sought, rather than refinement and high-class engineering. The cheapest thing that will do the work and do it well is wanted, and if this is done with a measure of good looks thrown in, the cyclecar can be sold at a low enough price to take. At first it will be a vehicle to which the motorcycle and back-seat driver can graduate, until the public realizes the clean and cheap possibilities of the vehicle.

A CYCLECAR for America must look like a car, not a toy, and hence must be long for its width. This brings the French method of seating the passengers tandem fashion. This method also allows of higher speeds, narrower tread, and better riding qualities on the road. With a tread over 36 inches wide a cyclecar in America would have trouble on country roads unless standard tread, and standard tread is out of the question with low-powered motors. Belt drive is good and has proved reliable and fast abroad in all weathers, while it has a great advantage of cheapness. Friction transmission should be almost ideal on these small power arrangements, it would seem.

THE most important items are springing, to get comfort in the low-powered cars at high speeds that are possible, and low weight. In the French cars passengers sit on cushions almost on the floor or swing in hammock seats, which are said to be very comfortable. The cyclecar is not a touring car with expensive upholstery, though if the buyer wants to add this he may. The first thing is to make a car that will do things cheaply, and leave off expensive trimmings.

WHILE a motorcycle is fast it is dirty, and not a vehicle on which to ride to business; a cyclecar can give the same speed and house the driver comfortably behind a windshield, and cover him with a top when it rains. The cyclecar, too, can be an all-the-year-round vehicle instead of a 6-months-in-the-cellars motorcycle. Also there is no cost to garaging a cyclecar, for it can be run through an ordinary door, weighs not over 450 pounds and can be kept in the cellar or shed, or even under a tarpaulin in the back yard.

ONE can buy a whole set of cyclecar tires for the cost of one real motor car tire; while a gallon of gasoline will take the machine 40 to 50 miles. The cyclecar track record is 59.6 miles an hour, which is considerable speed when it is considered the power was but a standard air-cooled motorcycle motor. These cars can average 25 miles an hour on American roads and on account of their light weight go many places where big cars would sink in.

EVIDENTLY there is a big future for a cyclecar designed to do these things, but following the small-car idea will not bring it without too great manufacturing cost. America demands a cheap, but reliable, cyclecar. Already there are four firms incorporated in Detroit for making cyclecars, and some dozen in other localities, notably Chicago, so that a real crop of the new motor vehicles may be looked for soon, as the beginnings of an infant industry destined, with proper fostering, to grow to enormous proportions in a few years.

IT has been stated that the cyclecar in America would be applicable only to the boulevards. Adherents of this type of vehicle, however, claim that with a tread of 36 inches, practically any American roads may be negotiated without difficulty, with one wheel in the wheel track and the other in that smoothed down by the horses' hoofs.

Asks Three Billions for Road-Making

National and State Co-operation Proposed in Federal Bill

WASHINGTON, D. C., May 3—National and state cooperation in a three-billion dollar expenditure for good roads—1 billion being for construction and 2 billion for maintenance, and both extending over a period of 50 years—is proposed by a plan submitted this week by Jonathan Bourne, Jr., former senator from Oregon, to the joint congressional committee on federal aid in the construction of post roads.

Bourne's plan contemplates that the billion-dollar construction fund shall be apportioned among the states upon the basis of area, population, assessed valuation and road mileage, and that the several states shall deposit in the United States treasury their 50-year 4 per cent bonds for the amount due them and the government loan the states the par value thereof for road construction; the government raising its fund by the sale of its 50-year non-taxable 3 per cent bonds. By crediting each state every year with the excess 1 per cent interest paid by the state to the government over what the government pays on its bonds and allowing 3 per cent interest compounded annually on said excess 1 per cent, a sinking fund is established from which the government pays off the bonds at the end of 50 years and the state is relieved of the payment of principal on its bonds.

The government will also under this plan pay to each state annually for road maintenance an amount equal to 2 per cent of the amount of bonds on deposit, provided the state expends a like amount for the same purpose.

The plan also provides for team work between the states and federal government but avoids subservience of the state to any federal bureau or department. It suggests the establishment of a national school of highway and bridge engineering here in Washington so as to create a supply of trained specialists from whom the states could draw for state and district engineers.

Good roads legislation is considered of such importance and so many highway improvement measures are pending in congress that leading democrats propose to create a new standing committee in the house of representatives, to be known as the committee on good roads. A recommendation for the creation of such a committee was made during the federal aid for good roads convention of the American Automobile Association, held in this city in March last.

Provision for the committee of twenty-one members is made in a resolution introduced in congress by Representative Henry, of Texas, chairman of the rules committee. There are now awaiting action more than fifty bills proposing improvements of

the roads of the country and providing federal aid for better highways. If the new committee on good roads is created it will take over a part of the work of the present committee on postoffices and post roads. There is every reason to believe the committee will be created.

WOULD AMEND PATENT LAWS

Washington, D. C., May 3—Some important amendments to the patent laws of the United States are proposed in a bill just introduced in congress by Representative Moon. One is that section 4924 of the revised statutes be amended to read as follows:

Section 4924. That where the patentee of any invention or discovery, the patent for which was granted within 17 years and 9 months preceding the date of the passage of this act, shall desire an extension of his patent beyond the original term of its limitation, he shall make application therefor, in writing, to the commissioner of patents, setting forth the

reasons why such extension should be granted; and he shall also furnish a written statement, under oath, of the ascertained invention or discovery, and of his receipts and expenditures on account thereof, sufficiently in detail to exhibit a true and faithful account of the loss and profit in any manner accruing to him by reason of the invention or discovery. Such application shall be filed not more than 9 months nor less than 90 days before the expiration of the original term of the patent and no extension shall be granted after the expiration of the original term.

Congressman Moon proposes that section 4927 of the revised statutes be amended to read as follows:

Section 4927. That the commissioner shall, immediately after the receipt of said application and of the report of the principal examiner, as provided for in section 4926 of the revised statutes, refer said application to the court of claims to hear and decide upon the evidence produced both for and against the extension; and if it shall appear to the satisfaction of the court of claims that the patentee, without neglect or fault on his part, has failed to obtain from the use and sale of his invention or discovery a reasonable remuneration for the time, ingenuity and expense bestowed upon it, and the introduction of it into use and that it is just and proper, having due regard to the public interest, that the term of the patent should be extended, the court of claims shall make a certificate thereon, renewing and extending the patent for a term not to exceed 17 years from the expiration of the first term. Such certificate shall be forwarded to the commissioner of patents, to be reported in the patent office; and thereupon such patent shall have the same effect in law as though it had been originally granted for and including the extended term.

Coming Motor Events

CONTESTS

May 11-12—Targa Florio road race, Sicily.
May 14-15—West Hudson and Catskill tour.

May 29-30—Interclub reliability, Chicago Motor Club—Illinois A. C.

*May 30—Indianapolis speedway meet.

*June 7—Quaker City Motor Club and motor clubs of Delaware county Interclub run; Philadelphia, Pa.

June 12-13—Interclub match, Chicago Athletic Association—Chicago Automobile Club.

June 16-18—Reliability, Columbus Automobile Club, Columbus, O.

June 19—Algonquin hill climb, Algonquin, Ill.

*June 25-28—Chicago Automobile Club reliability to Boston, Mass.

June—Tour Iowa State Automobile Association.

July 1—Indianapolis to Pacific coast tour; promoted by Indiana Automobile Manufacturers' Association.

July 1-16—Motor plow competition, Winnipeg, Can.

July 4—Columbus, O., 200-mile track race.

July 4—Track meet, Taylor, Tex.

*July 4-5—Track meet, Sioux City Auto Club.

July 5-6—Road race, Tacoma, Wash.

July 12—French grand prix.

*July 11-19—A. A. A. endurance run, Minneapolis to Glacier Park, Mont.

*July 27-28—Tacoma, Wash., road race.

August 29-30—Elgin road races.

August 30-September 6—Reliability run, Chicago Motor Club.

September 1—200-mile track race, Columbus, O.

September 21—French light-car road race, Boulogne.

September 25—Tourist trophy stock-car road race, Isle of Man, Great Britain.

October 4—Start of Chicago Motor Club's around Lake Michigan reliability.

*November 24—Vanderbilt road race at Savannah, Ga.

*November 27—Savannah grand prix.

MEETINGS

May 20-21—Convention of Electric manufacturers in Boston, Mass.

June 5-7—Mid-summer meeting S. A. E., Detroit.

June 23-28—International road congress, London, Eng.

*Sanctioned by A. A. A.

*Sanctioned by A. C. A.

PREPARE FOR TRADE MERGER

New York, May 7—Special telegram—The members of the N. A. A. M., Inc., and of the A. B. of T. have agreed unanimously to the plans adopted by their respective executive committees for the dissolution of the two associations and the consolidation of their interests in the newly organized Automobile Chamber of Commerce. Meetings of the executive committees of the two bodies were held today. They were the last gathering at which anything more than routine will be transacted. Tomorrow the members of the N. A. A. M., Inc., which is a Connecticut corporation, will meet at Hartford and vote to take the necessary legal steps to disband. It is intended that on the following day the Automobile Chamber of Commerce will commence active work. The members of the A. C. of C. will be held at Detroit on Monday, May 19.

BOSTON TO HAVE TRUCK SHOW

Boston, Mass., May 3—The Boston Commercial Motor Vehicle Dealers' Association met on Wednesday evening at the Hotel Lenox to hear the report of the committee that was appointed to secure from the representatives of motor trucks in and about Boston their opinion as to the feasibility for another show. The committee reported that all exhibitors were questioned and that more than 80 per cent were in favor of holding an exhibition next March following the passenger car show. A vote was then taken and it was decided to hold a show in March.

Thirty-One in Hoosier Race

Entry List for 500-Mile Sweepstakes Closes with America, France, England, Germany and Italy Represented—Seven More Nominated Than Started in 1912

LIST OF ENTRIES THIRD ANNUAL 500-MILE SWEEPSTAKES

Car	Cyl.	Bore	Stroke	Displace.	Driver.
Stutz	4	.....	.....	.....	Anderson
Stutz	4	.....	.....	.....	Merz
Nyberg	6	6	4	389	H. Endicott
Keeton	4	5 3/32	5 1/2	387	Burman
Mason	4	4 1/8	6	350.5	Evans
Mason	4	4 1/8	6	350.5	Tower
Unknown	.....	.....	.....	.....	.....
Stutz	4	.....	.....	.....	Herr
Sunbeam	6	3.54	6.29	380.8	Guyot
Henderson	4	4 1/8	6	350.5	Knipper
Fox Special	4	4 1/8	5.5	389	Wilcox
Smada	4	3.5	5	192.4	Adams
Peugeot	4	4 1/4	7 1/8	446.8	Goux
Peugeot	4	4 1/4	7 1/8	446.8	Zuccarelli
Amel	4	4.5	5	318.1	Liesaw
Schacht	4	4 1/8	5.5	410.6	Jenkins
Mercer	4	4.8	6 1/8	447.9	DePalma
Mercer	4	4.8	6 1/8	447.9	Bragg
Mercer	4	4.37	5	299.7	Wishart
Mercedes-Knight	4	3 1/8	5 1/8	250	Pilette
Pennebaker-Stearns-Knight	4	5 1/8	5 1/8	443.5	Pennebaker
Tulsa	4	4 1/8	5.5	389.9	Clark
Mercedes	4	4.4	7 1/8	440.8	Mulford
Isotta	4	4.6	6	443.86	Want
Isotta	4	4.6	6	443.86	Tetzlaff
Isotta	4	4.6	6	443.86	Trucco
Case	4	.....	.....	450	Disbrow
Case	4	.....	.....	450	Endicott
Case	4	.....	.....	450	Nikrent
Unknown	.....	.....	.....	.....	.....
Mason-Special	.....	.....	.....	.....	Haupt

INDIANAPOLIS, Ind., May 3—The entry list for the 500-mile race on the speedway on Memorial day has closed with thirty-one declarations, seven more than last year. Included in the list are representatives of five nations—America, England, France, Germany and Italy, giving the long grind a truly international flavor.

From abroad are coming the Sunbeam of England, the Peugeot of France, the Mercedes of Germany and the Isotta of Italy. Five foreign drivers are booked—Guyot, Goux, Zuccarelli, Trucco and Pilette. There also are listed two unknowns, the identity of which probably will not be divulged until the elimination trials. Trucco, winner of the 1908 Targa Florio, sails from Havre on May 10, while Pilette, the Belgian who is to drive for E. C. Patterson, sailed May 3 and is expected to land in New York Sunday or Monday.

Eleven cars were declared just before the lists closed. Motor Age announced the Merceder-Knight, Tulsa and the three Cases last week, but since then the Pennebaker-Knight, three Isottas, an unknown and a third Mason have been dropped in. The Mason team has been selected, consisting of Tower, Evans and Willie Haupt. The Pennebaker entry is one made by R. Pennebaker, of Memphis, a former Stearns agent, who has taken a Stearns-Knight motor and cut it down in size until it comes within the 450-inch limit.

Frenchmen Book Passage

Paris, April 26—Jules Goux, Paul Zuccarelli and their two mechanics, completing the Peugeot team, have booked passages

for New York on the French liner La France, sailing from Havre on the morning of Saturday, May 3. The two Peugeot racers have been packed for shipment on the North German Lloyd liner Kronprinzessin Cecilie, sailing from Cherbourg on the morning of April 30.

The Peugeot race drivers will take delivery of their cars as soon as they arrive in New York and will proceed direct to Indianapolis, probably arriving there on May 12. This will leave about 18 days in which to prepare for the race. As the cars are already thoroughly tested out, the drivers will only have to familiarize themselves with the track and select the most suitable gear ratio. This will be done by making changes in the size of the wheels, Rudge-Whitworth detachable wheels being employed. No decision has been arrived at regarding the make of tire to be used in the race; it is quite probable that the Peugeots will use some American tire.

Albert Guyot, the driver of the six-cylinder Sunbeam, has booked passage on the French liner La Provence, sailing from Havre on the morning of Saturday, May 10. He will be accompanied by Crossmann an Englishman, who has had considerable experience of the Sunbeam on Brooklands track. On this occasion Crossmann will act as mechanic. The Sunbeam racer already has been shipped for New York on a cargo boat sailing from Liverpool.

SOLDIERS TO FEED TOURISTS

Indianapolis, Ind., May 5—To get advice as to feeding the participants in the Indiana-Pacific tour, which starts from In-

dianapolis July 1, the tour committee called upon the commissary department at Fort Benjamin Harrison and as a result a couple of army cooks and a sergeant probably will make the journey to the coast. These men know just how to feed people properly, especially when they are on the road. However, in order to be certain that the feed staff leaves the Hoosier capital on July 1, the tour committee must consult further with men higher up.

Already there are seventeen entrants for the big journey, but it is expected that before the run starts many more manufacturers will place their cars on the list. At least three motor trucks will accompany the tourists, and these vehicles will take the burden of the food, camp kitchens and supplies, for sleeping quarters will be arranged at nightfall at any place where the motorists might be. The motor trucks will leave early each morning, while the rest of the band will follow later. The procession will be led from start to finish by Ray McNamara, the veteran ocean-to-ocean motorist.

The state of Wyoming has affixed its seal to a set of resolutions adopted by the legislature of that state, approving the Indiana-Pacific tour.

C. B. Warren, who is leaving the state, has resigned as president of the Indiana Automobile Manufacturers' Association. Last night H. O. Smith, president of the Premier Motor Mfg. Co., was elected to succeed him. Carl G. Fisher was elected as director. R. P. Henderson was selected as treasurer for the Indiana-Pacific tour.

NEW YORK OPENS CONTEST SEASON

New York, May 2—The recently organized Motor Dealers' Contest Association held its first contest of the season this evening, which took the form of a secret time sociability run from Columbus circle to Hotel Cedarciff, New Rochelle, 17.5 miles. Fifty-four cars started in the gasoline and electric division. The secret time for the gasoline cars was 56 minutes 21 seconds, and the winning car was J. T. Kelly's Overland, which took 56 minutes 10 seconds. Second prize went to W. Cullem, de Dion, 56 minutes 50 seconds, and third prize, Miss Stella Mayhew, Regal, 55 minutes 21 seconds. Gold, silver and bronze medals were awarded.

Nearly a score of electrics contested for the W. C. Poertner cup. Their running time was 80 minutes 17 seconds, a speed of 13 miles per hour. Mrs. A. E. Waxham in a Waverley was first, with 84 minutes 49 seconds. P. S. Rogers in a Waverley was second, 72 minutes 36 seconds, and a Baker entered by the New York Edison Co. was third, 68 minutes 57 seconds.

QUAKERS HOLD SOCIABILITY

Philadelphia, Pa., May 4—Favored by ideal weather and road conditions, the local motor contest season was pried open yesterday when the Quaker City Motor Club conducted its sixth annual sociability run to Atlantic City, N. J. While nu-

merically smaller than some of the previous similar events, the run was a success in every way. Forty-one cars were officially entered, of which thirty-one checked in at the Hotel Strand.

D. Walter Harper, driving a Dreadnought Moline, by finishing 31 seconds less than the officially selected time, captured the first prize. Three hours, 27 minutes, 13 seconds, was the secret time and Harper's time was 3 hours, 27 minutes, 30 seconds. Second, third and fourth prizes were captured by American cars driven respectively by James Morgan, Ralph D. Earle and C. O. Herbert, their times being 3:27:35, 3:26:35 and 3:28:45. Miss May Hardart, driving an Elmore, won the special women's prize, finishing in 3:24:13.

INTERCLUB RUN REGULATIONS

Philadelphia, Pa., May 3—Preliminary plans and regulations that are to govern the interclub reliability run to Gettysburg to be held on June 7 under the joint auspices of the Quaker City Motor Club, the Automobile Club of Philadelphia, the Automobile Club of Germantown and the Delaware County Automobile Club have been completed.

The run is to be open to members of the four organizations above mentioned who are private owners and not connected with the motor industry. Members of the trade are invited to accompany the run as non-contestants. A trophy will be awarded the club having the most teams finishing with a perfect score, the entrants being divided into teams of five for each club. Entrants may choose any route to Gettysburg desired, the only restriction being competitors must finish by 3 p. m.

SEAMLESS ANSWERS BATAVIA

New York, May 6—The Seamless Rubber Co. of New Haven, Conn., has filed its answer to the complaint of the Batavia Rubber Co., which demands that the Seamless concern cease to manufacture tire treads resembling that of the Batavia company. The defendant has denied all the allegations made in the complaint and the matter will come to trial. It is hardly probable that the suit will come up in court before the opening of the fall term.

STUDEBAKER'S APRIL SALES

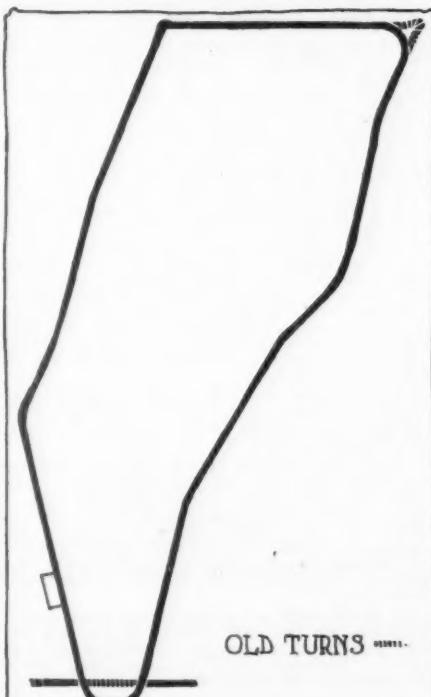
Detroit, Mich., May 6—In 3 of the 4 weeks of April, the Studebaker selling organization in the United States broke its sales record of the second week in June, 1912, in which the high mark of former history had been set. Complete returns for April will indicate the retail sale of over 5,000 Studebaker cars, according to Assistant Sales Manager Philp.

OPENS YOSEMITE PARK TO MOTORISTS

Washington, D. C., May 3—Secretary Lane today rescinded an order which bars motorists from Yosemite park, on the grounds that thereby a large proportion of the people will be enabled to enjoy the beauties of the national park.

Elgin Plans Record Course

Sharp Turns to Be Eliminated so Kane County Circuit Will Be an 8½-Mile Road Speedway—Milwaukee Undecided as to What It Will Do in Racing This Year



MAP SHOWING ELGIN COURSE WITH NEW TURNS

CHICAGO, May 5—Additional improvements planned for the Kane county circuit by the Elgin Automobile Road Race Association promise to make the course one of the fastest in the country and one that even will threaten the Santa Monica course's supremacy. If a speed of close to 80 miles an hour cannot be maintained in the Elgin National race next fall, it will be surprising. These contemplated improvements mean that the Kane county course will be in reality an 8½-mile circular speedway, with no sharp turns.

At the meeting of the Elgin Automobile Road Race Association yesterday it was decided to build a new turn at the east end of the course. Instead of swinging sharply at Hornbeck's, the road will curve through a big field which heretofore has been used by the commissary. This sweep will permit the racers to take the turn without slowing in speed. The next big change is to be at McQueen's, where another new stretch of road will make a cut-off between two picturesque knolls that will make this turn as easy to negotiate as the one on the east leg.

Several small hills on the home stretch will be removed and although this leg already is extra wide it is contemplated adding even to this width. In addition the Kane county highway commissioners already have spent \$1,500 in widening the back stretch.

The Elginites will again close with the Chicago Automobile Club to handle the meet. They also have contracted for a covered grand stand and several of the concessions already have been let.

MILWAUKEE PLANS UNCERTAIN

Milwaukee, Wis., May 5—Whether or not Milwaukee will put on any road racing during 1913 is still problematical, and at this time signs seem to point to abandonment of plans taken up after the grand prix and Vanderbilt cup races last October, to make further use of the Wauwatosa course, built at a cost of more than \$50,000. Interest in any plan to build up a big international race around the Pabst Blue Ribbon trophy is only half-hearted and it appears now that Milwaukee road racing enthusiasts must go to Elgin to satisfy their craving this year. If the Pabst cup is to be made a feature, the Wisconsin Motor trophy will be added as the prize in a second race.

The heavy deficit that resulted from the running of the international road races at Milwaukee last October has made it a problem to get sufficient backing to conduct another series of road races. Although the deficit was caused by the postponements due to rain, and profit would have been the case instead of deficit had the original program gone through, the proposition does not appeal to the moneyed men who would be expected to back it.

It would require a no inconsiderable expenditure of cold cash to put the Wauwatosa course in shape for racing. The promoters of the 1912 races builded well for the time being, but it was necessarily a hasty job and after the frost is out of the ground there are many spots which resemble sink-holes. The course is a favorite place for Sunday drivers, who seek the 8 miles of macadam as a haven from the uniformly poor roads in Milwaukee county, but many never go back.

It is likely that a meeting will be held within the month of May to discuss the racing situation.

COAST RACE ATTRACTING ENTRIES

Los Angeles, Cal., May 3—Fourteen entries already have been received for the Los Angeles-San Francisco road race which is to be run July 4, the first nomination being that of A. B. Daniels, of Coronado, who has nominated a Locomobile. Cobb Evans, of Fresno, has entered an Overland.

It is unlikely that there will be a Los Angeles-Phoenix road race this year and it is possible that the race will be from El Paso, Texas, to this city.

Car Manufacturers

Claim Made that There is Joker in Underwood Bill

BALK ON PARTS CLAUSE

Foreigners May Take Advantage of 20 Per Cent Rate

HOUSE DISCUSSES DUTY

WASHINGTON, D. C., May 5—Declaring that the proposed tariff is a menace to the motor car industry in the United States, twenty-seven manufacturers, acting through a committee of five, have protested officially against the Underwood-Wilson bill which imposes the following duties on foreign imports:

Finished motor cars and motor car bodies, 45%
Motor car chassis..... 30%
Finished parts of motor cars, not includ-

ing tires..... 20%

The spokesmen for the motor car industry are John N. Willys, vice-president of the Willys-Overland Co.; W. C. Leland, general manager of Cadillac Motor Car Co.; Charles Clifton, treasurer of the Pierce-Arrow Motor Car Co.; Hugh Chalmers, president of the Chalmers Motor Car Co., and Henry B. Joy, president of the Packard Motor Car Co.

Twenty-seven Makers Protest

The following concerns are represented by the committee of five:

Autocar Co., American Locomotive Co., American Motors Co., Chalmers Motor Car Co., Cadillac Motor Car Co., Cole Motor Car Co., Garford Co., Haynes Automobile Co., Hupp Motor Car Co., Locomobile Co. of America, Kissel Motor Car Co., Lozier Motor Co., Mitchell-Lewis Co., National Motor Vehicle Co., Oakland Motor Car Co., Olds Motor Works, Packard Motor Car Co., Peerless Motor Car Co., Pierce-Arrow Motor Car Co., Pope Mfg. Co., Reo Motor Car Co., Staver Carriage Co., Stevens-Duryea Co., Studebaker Corp., Warren Motor Car Co., White Co. and Willys-Overland Co.

The manufacturers favor the retention of the rate of 45 per cent—the present duty under the Payne-Aldrich tariff—on finished motor cars and bodies, motor car chassis and finished parts, claiming that this is a just rate when the difference in the cost of production abroad and in the United States is taken into consideration.

In the brief of protest, sent by the committee of five to congress, the manufacturers declare that "the democratic majority is arranging its tariff provisions so as to take care of the foreign manufacturer and the foreign workman by opening the American market to them on the lowest possible terms."

The brief states that the "real effective

File Tariff Protest

duty is 20 per cent" and points out two jokers in the Underwood-Wilson bill in the following paragraphs:

Finished motor cars and motor car bodies, 45 per cent. This is the recommendation of the ways and means committee. * * * It means absolute approval and commendation by the democratic majority of the present ways and means committee that the Payne-Aldrich bill was proper and wise, because it is a confirmation and affirmation of exactly the same rate of tariff as was incorporated in the Payne-Aldrich bill.

The second clause in the motor car schedule of the new Wilson bill reads, "Motor car chassis, 30 per cent." Think of it! Printed in the bill! Recommended by an "American" ways and means committee that the duty should be one-third lower than before, and 3 per cent lower than that requested by the European manufacturers' representative, Mr. Charles H. Sherrill, in his plea to the ways and means committee.

It certainly is a joker to have finished motor cars in the tariff schedules at 45 per cent, and to have automobile chassis listed at 30 per cent! It is important that according to the records of the custom house practically all of the imports of motor cars is in the form of chassis—that is, running gear of the car, without the body.

The chassis itself is really a completed motor car. European factories only manufacture chassis; the chassis is the car itself from the trade point of view.

Especially should it be noted that the chassis is the thing the European manufacturer wants to bring in at the minimum rate of duty. European motor car manufacturers do not make the bodies except to a very small extent, as bodies are too bulky and too subject to damage in shipping, and too expensive to ship by reason of their bulk in proportion to their value.

A joker, did we say? Let's read further and take up the next clauses in the new Wilson tariff bill, as far as it refers to motor cars! "Finished parts of motor cars, not including tires, 20 per cent."

That seems like an innocent paragraph.

But parts of a motor car make a motor car. A chassis is composed of parts. The accepted phraseology of the trade is that part-makers produce motors, axles, transmissions, frames, steerings, wheels, magnetics, etc. The chief cost of chassis is in the labor and material necessary to make up these parts, not in the labor necessary to unite them into a chassis. The cost of joining together these parts or sections is indeed a minor one. It is a negligible per cent of the chassis cost.

Is a European manufacturer going to import his product into America as chassis at 30 per cent duty when he can ship it at less cost of freight and enter it at a lower valuation for duty purposes as parts or sections and pay a duty of 20 per cent only, and have simply to assemble the "sections" into chassis at a cost of approximately one per cent?

It is clear that the foreign manufacturer will provide for uniting the imported parts or sections in America. Chassis as such will only be imported by the foreign manufacturer without sufficient means to establish an assembling branch here or by the casual purchaser who buys abroad.

The first and second clauses therefore are of absolutely no force and effect with the third clause also in the bill.

House Discusses Tariff

The duty on motor cars occupied the attention of the house of representatives during the tariff debate last week and despite all arguments made by the republicans, it is practically assured that the Underwood schedules will be passed by the lower body. What action will be taken in the senate is problematical, but President Wilson has been assured by the senate leaders that the Underwood bill will be enacted in practically the same form in which it may come from the house.

The debate on motor car tariff lasted more than an hour, the republicans attacking the same jokers as are commented upon in the manufacturers' brief of protest and the democrats defending the reductions

with claims that the lower rate on foreign importations will not bring European makers of high-priced cars into competition with the American builders but only decrease the cost of a luxury.

REGAL INCREASES CAPITAL

Detroit, Mich., May 5—The capital stock of the Regal Motor Car Co. was increased from \$1,000,000 to \$3,000,000 on April 24. Of the latter amount, \$2,600,000 has been subscribed for and paid in, while the remaining \$400,000 of preferred has been set aside as a reserve for any future needs of the business.

The personnel of the Regal company has been altered somewhat, in that C. R. Lambert, John Lambert and Bert Lambert, who formerly held the positions of president, secretary and treasurer, respectively, have retired from active participation in the management. Fred W. Haines, former vice-president, has been made president, he at the same time retaining the general management. H. H. Emmons has assumed the duties of secretary and treasurer. There is no vice-president under the new regime.

Although retiring from active capacities, the Lamberts will still remain on the Regal company's directorate, which includes Mr. Haines and Mr. Emmons in addition.

The concern's schedule calls for a production of about 7,500 cars this year.

EVANS MOVING TO NASHVILLE

Detroit, Mich., May 5—The Evans Motor Car Co., which has absorbed the Automobile Mfg. and Engineering Co., a former Detroit concern fathered by R. H. Evans, has definitely located its plant at Nashville, Tenn., where a complete factory for the manufacture of commercial cars and motors is to be built, according to Mr. Evans. The Evans company was organized March 20 under the laws of Tennessee with a capital of \$50,000, which, however, is soon to be increased to \$200,000, it is stated.

The factory is to measure 60 by 200 feet and 500 trucks are to be made the first year with a force of men in the neighborhood of 500, which should mean much to the southern city. The Evans car has a capacity of 1,500 pounds and is equipped with a 30-horsepower Continental motor and a Timken rear axle.

PAIGE PLANS EXPANSION

Detroit, Mich., May 3—At the annual meeting of the board of directors of the Paige Motor Car Co., held recently, Alexander McPherson retired from the directorate and his place was taken by J. F. Bourquin, general manager of the company. No other changes were made in either the directors or the officials. The latter are: H. M. Jewett, president; E. H. Jewett, vice-president; Gilbert Lee, treasurer; William B. Cady, secretary, and J. F. Bourquin, general manager. The directorate is composed of the following: H. M. Jewett, E. H. Jewett, E. D. Stair, S. L. Depew, W.

E. Buhl, Gilbert Lee, J. F. Bourquin, C. H. Hodges and C. B. Warren.

The Paige company plans increased activity, and to this end H. M. Jewett has given up active participation in his other interests in order to devote more time to the affairs of the Paige concern. A new plant is contemplated to take care of the increasing business, although no details as to this move are yet forthcoming.

INCREASES IN FRENCH EXPORTS

Paris, April 25—Although rumors of wars have caused a falling off in home business, the motor export trade of France continues to be good. According to the officials returns, the increase in exports for the first 3 months of the present year, compared with the corresponding period of 1912, is \$2,602,380. Four countries show a falling off in their purchases with France: England, \$281,940; Switzerland, \$77,340; Turkey, \$19,880; U. S. A., \$26,460. All other nations show an increase, the greatest jump being with the Argentine Republic. The official figures for exports during January, February and March, 1912 and 1913, are:

	1912	1913
England	\$2,859,360	\$ 2,577,420
Belgium	1,918,560	2,339,520
Argentine Republic	448,700	1,194,360
Brazil	449,640	729,420
Germany	600,900	680,460
Algeria	769,860	945,120
Italy	114,240	281,700
Spain	219,060	252,540
Russia	63,840	247,920
Switzerland	262,380	185,040
United States	168,780	142,320
Austria	61,920	76,320
Turkey	59,580	37,700
Other countries	929,280	1,844,040
	\$8,926,500	\$11,528,880

Imports of motor cars into France have increased, the figures for the first 3 months of 1912 being \$476,160, compared with \$838,560 for the present year, being an increase of \$362,400, or 76 per cent. The greatest increase has been obtained by England, Germany, Belgium, Switzerland and the United States. England has increased her business with France 125 per cent during these 3 months and Germany shows an increase of 128 per cent.

NEW YORK LAMP WORKERS STRIKE

New York, May 5—A general strike of motor car lamp makers was announced here 2 days ago, being the first strike of this kind. The men demand a 50-hour week and minimum wages of \$24, \$21 and \$18 for workers of the first, second and third classes respectively.

ONLY CAR IN BANKRUPTCY

New York, May 3—The Only Motor Car Co., of Port Jefferson, L. I., filed a voluntary petition in bankruptcy through its secretary M. E. Friend, in the Federal court of Brooklyn. The liabilities of the company are said to be \$148,405 and assets \$72,685.

GARAGES MUST USE SEPARATORS

New York, May 3—New York garage men must use gasoline separators for the straining of liquids before discharging

Production Reaches 1000 Cars a Day

Ford Passes Mark on Several Days in Month of April

TO AVERAGE 900 IN MAY

Six Months See 78,062 Machines Manufactured by Company

SALES TOTAL \$47,000,000

NOW METEOR MOTOR CAR CO.

Shelbyville, Ind., May 6—The name of the Clark Motor Car Co., whose plant and other assets were purchased at a receiver's sale by interests headed by Maurice Wolf, of Chicago, has been changed to the Meteor Motor Car Co. The new company organized under this name will continue the manufacture of cars in Shelbyville, building two models, one of 30 horsepower and the other of 40 horsepower. Production of cars under the new regime is in progress, the first shipment leaving the factory today.

KLAXON INCREASES STOCK

New York, May 5—The Lovell-McConnell Mfg. Co., Newark, N. J., has increased its capital to \$2,000,000, half of which is common stock and half 7 per cent preferred stock. The officers of the company remain the same. It is announced that no stock will be offered in the open market, but that the entire issue will go to persons active in the company's factory.

TO SELL MATHESON ASSETS

Wilkes-Barre, Pa., May 5—It is understood here that the property of the Matheson Automobile Co., now in bankruptcy, will be sold here at auction on May 20. The sale will be under the control of Receiver in Bankruptcy W. C. Shepherd, formerly president of the company. The property will be offered for sale in separate parcels, although it is hoped by some parties that the sale will be preliminary to a resumption of manufacturing operations and not a dissolution sale.

WARNER MAKING MOTORS

Detroit, Mich., May 6—H. L. Warner, one of the founders of the Warner Gear Co. and of the Muncie Gear Works, Muncie, Ind., announces that he has started a plant in Detroit to be known as the Warner-Detroit Motor Works, to build a motor of his design which has a bore of 3 1/8 inches and a stroke of 5 1/2 inches. This engine will be constructed in both four and six-cylinder types for either a unit power plant or a sub-frame construction. It will carry any standard sliding gearset or, if desired, it will be furnished with planetary transmission.

Detroit, Mich., May 5—The making of 1,000 cars a day no longer is a press agent's dream, for on several days during the month of April just passed the production of Ford model T has equaled or exceeded that figure. Averaging the entire month of April, the daily output of the Ford plant has been 869 cars per each 24 hours. Of course, there were some days when the number turned out fell somewhat short of the 1,000 mark, while on others it was considerably overshadowed.

During May the Ford production department expects to average in the neighborhood of 900 completed machines each working day. This means that on some days the number leaving the works will have to be greatly in excess of 1,000 to make up for the days when it falls below.

Such figures are hard to realize when it is considered that many a prosperous factory does not make many over a thousand cars a year, to say nothing of a quantity equal to a single month's Ford output. During April, there were about 21,000 Fords offered to the world. For March there were exactly 17,364 produced, with a total value of \$10,000,000 in round numbers. Thus, April showed an increase of manufacture of about 21 per cent over March.

The Ford company's records for the first half of its fiscal year ending with March and extending over the months of October, November, December, January, February and March, show that for this period a business of \$47,000,000 was done, which establishes a new mark in the annals of motoring. This many dollars represents the sale and delivery of 78,462 Ford cars for the past 6 months, which is in excess of the entire number turned out for the previous fiscal year by about 5,000 cars. This past half year's quota swells the total number of Fords produced from the beginning of manufacture up to April 1, 1913, to 234,753.

Peerless Makes Unusual Offer

Cleveland, O., May 5—A pressure of business upon the Peerless Motor Car Co. is revealed in a bulletin issued by E. J. Kulas, general manager of sales to the dealers and branches of the company. The company offers all customers whose orders are on the books for delivery before July 1, \$100 for delaying the delivery until after that date if the delay amounts to 30 days and \$200 if it amounts to 60 days.

Uses and Abuses of the Motor Vocabulary

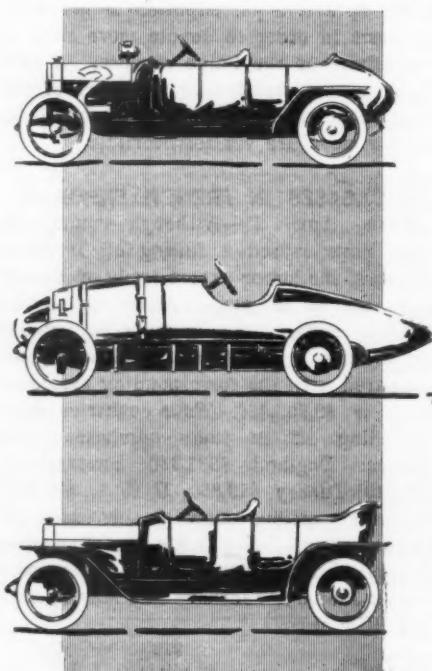
By Merrill C. Horine

flood of new terms has been constantly pouring into the motor dictionary, that the lexicographer has been left behind.

As a result many wild-cat terms have had their little day and fallen into disuse in a surprisingly short span of time. An example of this is the term torpedo, which was originally applied to motor cars whose surface lines were designed to conform in a degree with the stream-line principles. These bodies appeared from time to time because in the earliest days, being favored because of their racy appearance and the lessened wind resistance offered by them. These early types were for the most part freaks, and were mainly employed on racing chassis. Frequently, however, necessity gives birth to makeshift ways of accomplishing ends that, upon experience, we find are superior to the manner that would normally be employed were there no restrictions to modify our actions.

Derivations of Names

In the same manner as the 4-inch race in England by restricting the bore of the motors of participants, gave birth to the long-stroke motor, when, were no restriction made, large-bore square motors would have been employed; the Prince Henry tour in Germany gave birth to the stream-line or torpedo touring body. The reason this type was adopted was that in chassis details the participants in this contest were restricted to stock practice, while in body design they were given free rein. As in all speeds above 15 or 20 miles per hour wind resistance becomes a grave factor, the more crafty of the entrants came out with bodies with flush sides, scuttle dashes, merging into the hoods, and molded rear quarters. It was found that not only did these special bodies permit the car to perform better on account of the lessened wind resistance, but that the comfort of the passengers was increased. Less dust was raised, the mud, dust and wind did not blow over the knees of those in front, and, strange to



PRINCE HENRY TORPEDO
RACING TORPEDO
TORPEDO THAT IS MISNOMER

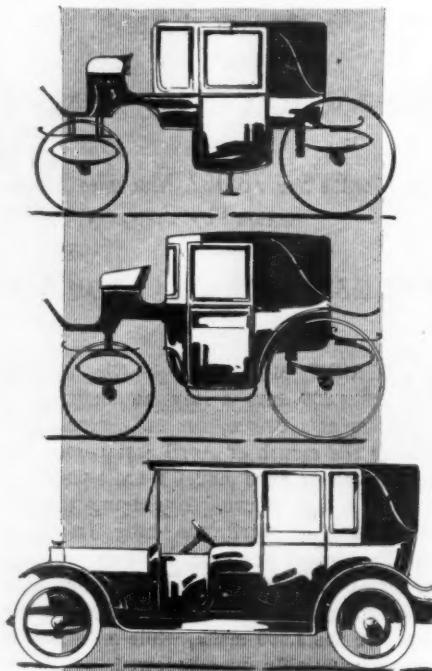
say, the appearance of the machines was notably improved. These types were dubbed torpedoes because of their emulation of the lines of torpedo projectiles, and also as Prince Henry types for a time.

Nomenclature Altered

Naturally for any but high-speed tours the stream-lines were not essential, so that in the modified forms of these bodies in which they were soon after adapted to standard cars, the features of smooth sides, continuous planes, and continuous gunwales were retained. These bodies retained all of the attributes of the torpedo body, including the name, except the torpedo properties. The so-called torpedo touring cars that were sold as stock bodies, were, in fact, not torpedo bodies at all, and while a few makers still cling to the term, the majority soon adopted the more rational names flush-side, vestibule or fore-door. The term fore-door was also applied to some makes to accentuate the fact that all doors were operative, and that that on the right side in front really was a door and not a blind. At the present time even these terms are falling into disuse, as the old side-entrance has

been abandoned, merely because this construction is standard, and therefore is understood, unless otherwise specified.

Another term that scarcely is ever encountered in modern times is the tour-about, which was



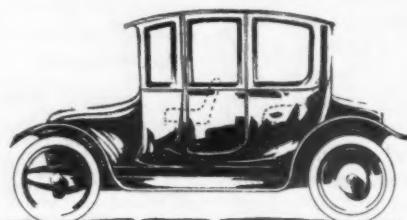
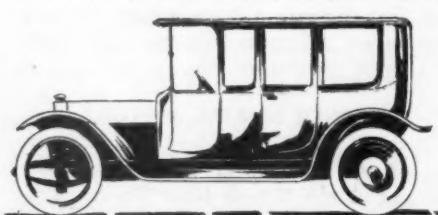
OLD-FASHIONED LANDAU
LANDAULET
MOTOR LANDAULET

NO Gibeonites hold the ford of the Jordan against the followers of Ephraim in the world of motoring, but as in every field of endeavor, the motor lexicon has its shibboleths that are the stumbling block of egregious Ephraimites, and the mark of the true followers of Jeptha. Some remarkable usages and applications of terms are used in the modern vocabulary of motoring, which, although known to be misnomers, are tolerated because of their general use, but nearly every motorist has found himself challenged with an expression which he is unable to explain to his own satisfaction and has to give it up.

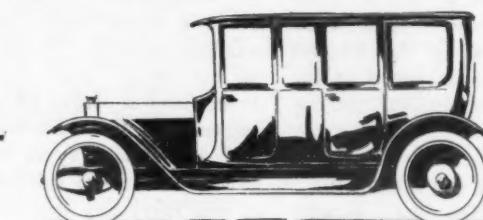
Confusion Over Names

Among the terms that are applied to the coachwork of motor cars, there are many that are very little understood and often misapplied, and considerable confusion exists in the catalogued names of motor car bodies. In the nomenclature of the chassis, however, the better known terms rarely are misapplied, but there is much in the pronunciation, usage, and spelling of the more mechanical phrases that is at fault in the vocabulary of motorists in general.

This naturally is to be expected, as the industry, sport, pastime, call it what you will, is as yet but an infant; the design of new devices has progressed faster than their designation; while such a



ELECTRIC LIMOUSINE



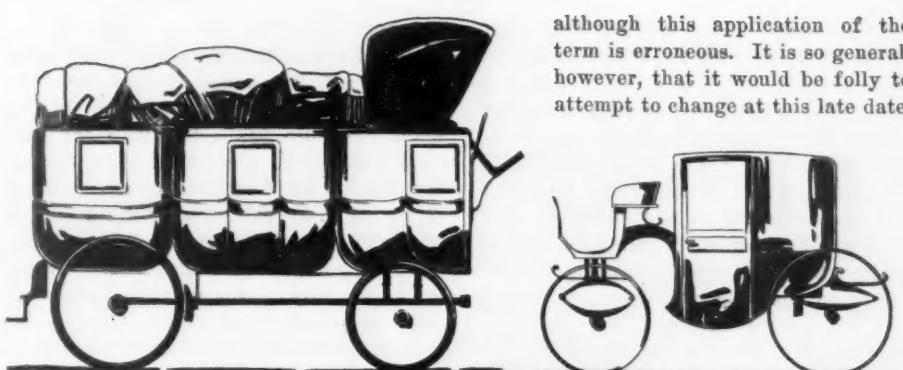
LIMOUSINE BERLINE LIMOUSINE

quite sensibly applied to that type of body designed for runabout work, but partaking of the nature of a touring car. In fine, these cars were four-seated bodies without inclosures. With the advent of the fore-door this type disappeared.

Originally the term phaeton was taken from the Greek mythological character Phaethon, son of Helios, the sun-god, to apply to a type of open carriage in which the seats, two in number, and accommodating four persons were not inclosed. One prominent manufacturer being at a loss for a name for a new type of fore-door four-passenger touring car that would distinguish it from the touring car, adopted the term torpedo-phaeton, later shortening it to phaeton. The very term torpedo-phaeton is a misnomer, as the phaeton is by very nature an open car, while the true torpedo is most emphatically inclosed.

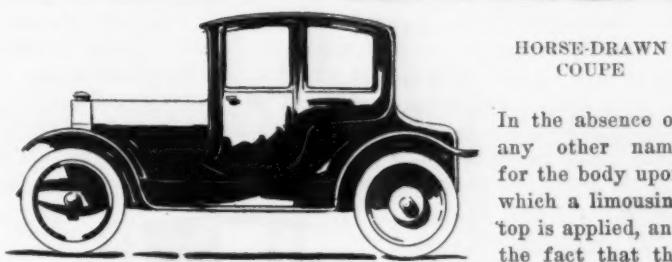
Close-Coupled an American Term

The close-coupled body is an American creation that was originally designed to take the place of the tourabout or toy-tonneau, affording accommodation for but four passengers, weighing little, and being therefore adapted to fast work, but retaining, or even surpassing the comfort of the touring car, and losing no whit of its dignity. The term was derived quite



OLD-FASHIONED
DILIGENCE

although this application of the term is erroneous. It is so general, however, that it would be folly to attempt to change at this late date.



HORSE-DRAWN
COUPE

been jumbled to quite as great an extent as in the realm of open cars. Among the pioneers in the closed car field are the limousine and landaulet. The former is derived from a form of great-coat that is worn by the inhabitants of the province of Limousine, France. Later when carriage tops came into use, this term was applied to them to express the idea of the acme of protection, such as was supposed to

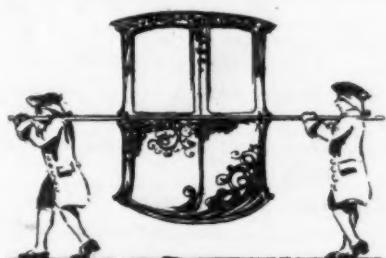
In the absence of any other name for the body upon which a limousine top is applied, and the fact that the term as applied to tops has fallen into disuse, this much may be conceded to idiom.

The demi-limousine which was more in vogue formerly than now is simply a limousine on which the side panel may be removed, and the car converted into a semi-open car, with rolled-up side-curtains as a precaution against storms.

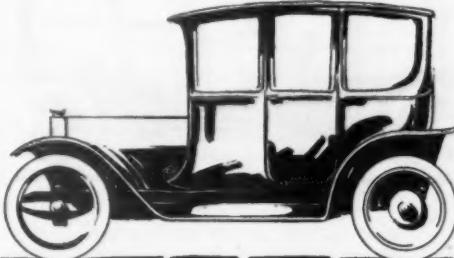
Landaulet Antecedents

The landaulet, or landaulette, as it is often misspelled, is not original with motor cars, as is the limousine, but is merely an adaptation of a body that has been used in horse-drawn vehicles for some time. The original of this type is the landau, named after the town of Landau, Germany, which never has successfully been applied to a motor car chassis. The landau is a closed body in which the driver is outside, and two seats are placed inside. The top is made in two parts, which fold down in the front and rear.

The landaulet has but one seat, and only the rear portion is collapsible. In this type as in the landau, the driver's seat is unsheltered. In motor car use, however, an extension of the roof is usually made over the driver's seat, and extra folding chairs are placed in the rear portion.



ANCIENT SEDAN



MOTOR SEDAN

reasonably from the fact that the rear seat was situated close to the front seat, or in other words the tonneau was coupled closely to the front compartment.

The result was full-height seats with upholstery of regulation depth, with just sufficient leg-room in the tonneau for the single seat. The center of the rear seat was forward of the axle, which made for smooth riding, increased the baggage-carrying facilities, and made getting in and out of the car easier. Some of these were fitted with rear doors only, and some with doors all around. They never attained a great amount of popularity as they had not the spectacular lines of the toy-tonneau, and with the overhang of the radiator over the front axle that was common, the appearance was not graceful.

Raceabout a Runabout Type

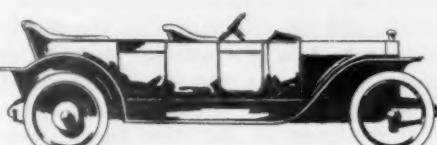
The raceabout is merely a runabout type that is built to imitate the construction of racing machines, but not designed to be used in actual racing. It finds its followers mainly among those who demand speed ability and a dashing appearance mainly for runabout work.

In the closed-car field, the lexicon has

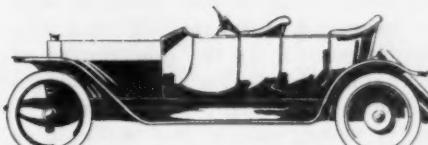
been represented by the Limousine coat. With the same idea in mind, this type of top was developed, the name limousine referring always to the luxurious type.

Meaning of "Limousine"

As applied to motor cars, it was originally a top covering the entire vehicle, the rear portion being inclosed in wood and glass, after the manner of a coach. Subsequently the term limousine has been applied to the entire body or vehicle,



HORSE-DRAWN PHAETON
PHAETON THAT IS MISNOMER



THE ORIGINAL PHAETON
CLOSE-COUPLED CAR

The coupe, in its original form consisted of a horse-drawn vehicle with one seat inclosed and the driver's seat outside. The name was derived from the French word *couper*, to cut, the idea being that the coupe was a body which had been cut from a larger one. The fore and after sections or compartments of a continental diligence are called the coupes.

The name of the coupe carriage doubtless arose from the appearance of having been cut from a diligence. As applied to a motor car quite a different vehicle has been made of it. There is no driver's seat outside, but the passenger drives it himself, from within, and while the appearance of having been cut off from a car of better proportions is apparent in many designs, the recently-revived term sedan could be applied with a great deal more of aptitude. The sedan, be it known, consists of a body in which a single seat is inclosed, while the drive is external of the vehicle. While this does not exactly suit the case, it more nearly approximates a prototype than anything else.

The type of motor car that most closely resembles the coupe is commonly termed a brougham, as applied to gasoline chassis, and a limousine among electrics. The term brougham cannot be said to be greatly misapplied in the case of the gasoline car, as the brougham was a vehicle quite similar to the coupe, with the exception that the seat was greatly cut under to permit of short turning. This body was given its name in honor of Lord Brougham. The term brougham is grossly misused as applied to electric bodies, referring to a four-passenger closed body, with seats facing. While the original broughams were made with such a seating arrangement inside, they were chiefly characterized by the fact that there was no window at the side of the rear seat, and had a high cut-under for the front wheels.

Electrics Often Mis-named

In fact the electric builders seem to be the greatest offenders against the rules of body nomenclature, their coupes being frequently fitted with two seats, their limousines being almost identical with the broughams, except that the front seats face forward or to the side, instead of backward. The electric victoria, which is a single-seated affair, with possibly a pair of folding seats to face backward on the dash, little resembles the six-seated victoria carriage.

Returning to the sedan, instead of applying it to the coupe, the type most aptly adapted to the name, motor car body workers have affixed it to a type that no more resembles the sedan than the tonneau looks like its antecedent, the French hogshead. The original sedan was a light, covered chair which originated in the orient, centuries ago, and later came much into vogue in colonial times owing to the scarcity of horses. The sedan always was carried upon the shoulders of men, and in but few instances was it made sufficiently wide for the accommodation of more than one person.

Motor Sedan a New Creation

Look from this to the five-passenger sedans that are to be seen at some of the local showrooms. They practically are the same vehicle as the mis-named electric limousine. They are distinctly new crea-

familiar object. In accord with this idea, he calls the first rear motor car seat a tonneau, because of its ludicrous similarity to a barrel, the small closed car a coupe because it looks as though it had been cut off of a larger body. The latest instance of the originality of the foreigner is the berline limousine, which originates, as its name implies, in Berlin, being named therefor.

GOVERNOR LOSES HIS CAR

Phoenix, Ariz., May 3—The motor car has entered politics in Arizona. One Abbott-Detroit has caused all kinds of trouble between Governor George W. P. Hunt and State Auditor J. C. Callaghan. The legislature was drawn into the controversy, with the result that the governor has lost the Abbott and now rides about on his official trips in an antiquated car.

Soon after Mr. Hunt became governor of Arizona, the board of control, of which he is chairman, advertised for a car for the state prison. The Arizona Motor Co. was the successful bidder, and the car purchased was an Abbott-Detroit.

Abbott never was turned over to the prison. Instead the governor delivered to R. B. Simes, warden of the penitentiary, the old car purchased by the former administration and used as the state vehicle.

When the Arizona Motor Co.'s bill was presented, Auditor Callaghan refused to sign a warrant, on the ground that the Abbott had been purchased for the prison and never delivered to that institution.

Wayland Wood, manager of the com-

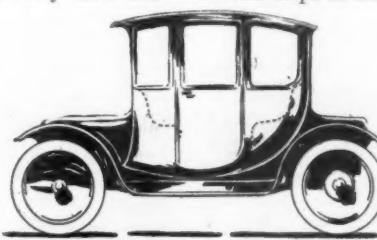
pany, applied to the superior court of Maricopa county for a writ of mandamus compelling the auditor to issue the warrant. The auditor was upheld, and the decision of the lower court was upheld by the supreme court of the state, which passed on the case.

Soon after that Representative Leon Jacobs introduced in the lower house of the legislature a resolution requesting the governor to deliver the Abbott to the prison. The resolution was adopted, after a sharp debate, and Governor Hunt complied. A few days later Auditor Callaghan signed a warrant for some \$3,000, representing the original price of the car and bills incurred for gasoline, oil, tires and accessories while it was being used by the governor.

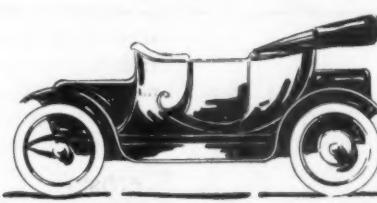
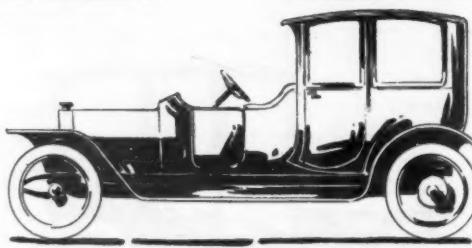
The old car has been repaired and turned over to Governor Hunt.



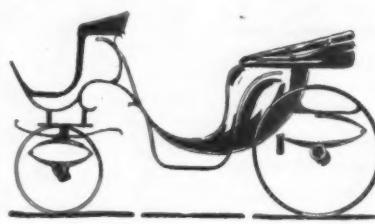
HORSE-DRAWN BROUHAM



ELECTRIC BROUHAM



ELECTRIC VICTORIA



VICTORIA

MOTOR BROUHAM

ations, of strictly American origin. This is natural, as they are intrinsically democratic, the driver occupying a chair in the single compartment.

A little research would reveal the fact that the nearest prototype—the modern sedan, so-called, has is the old leather-hung coach, of the type that was recently used in the coronation of King George. In these, a single compartment housed a whole family, while the horses were saddled and driven by riders.

It is a curious fact that while the American vaunts his independence of precedent, and his originality, he steadfastly refuses to coin new names. Most of his motor bodies are named, or mis-named from the names of foreign carriage types. The foreigner, on the other hand, names his vehicles after some circumstance of their design, or fancied resemblance to a

Wolverine Engineers Discuss Carburetion and Alloys

DETROIT, Mich., May 6.—That kerosene carburetion and aluminum alloys are especially live subjects in the motor car industry just at present was forcefully demonstrated by the large attendance at the meeting of the Detroit section of the S. A. E. last Thursday. Vice-Chairman Cornelius T. Myers, called upon P. S. Tice for the first paper, under the title of "Some of the Difficulties of Kerosene Carburetion." Mr. Tice first gave a resume of the characteristics of kerosene and their relation to gasoline under the following heads:

A, greater specific gravity; b, higher viscosity; c, less volatility, kerosene being practically non-volatile at the ordinary temperatures in this latitude; d, about the same specific heat; e, two and one-half times the latent heat of vaporization, or about 680 British thermal units per pound for kerosene; f, more diverse composition with more and more widely assorted foreign matter in suspension in the commercial product.

On the difficulties encountered in kerosene carburetion he said that the change of viscosity with change of temperature was especially hard to deal with, since the ratio between kerosene and gasoline of the rate of flow through a small orifice is 1.74 from 40 to 140 degrees Fahrenheit. This means that the motor has to be nursed until the whole system warms up, and to give flexibility and economy, it is necessary to supply the conventional heat. With the high boiling point and a latent heat of vaporization of about 680 British thermal units per pound it requires approximately 900 British thermal units to vaporize kerosene from an initial temperature of 40 degrees Fahrenheit.

Prohibitive difficulties easily may arise from the very high temperatures necessary

By L. V. Spencer

to furnish the fuel with the required heat units in the very short time available. The relative non-volatility of any of the constituents of kerosene, below 135 to 140 degrees Fahrenheit, has proven the greatest trouble in producing a commercially successful kerosene carburetor, for it is practically impossible to start with a cold motor and carburetor on this fuel.

The second part of Mr. Tice's paper dealt with the results of a preliminary investigation of kerosene fuel carried on by him in the laboratory of the Holly Bros. Co. The results of this research were given graphically by curves shown by means of lantern slides. The runs were made on a Ford motor with the regular carburetor and manifold replaced by a T manifold, with short branch, to which was attached a vertical copper tube. At the lower end of the tube a series of venturi-like throat pieces could be fitted. The flow of fuel was controlled by the relative position of the jet to the venturi neck. There was no throttle of the ordinary type. The copper tube was wound with resistance wire through which an electric current was passed, the amount of current being controlled by a rheostat. The kerosene used had a specific gravity of .817.

One set of curves was plotted between pounds of kerosene per brake horsepower-hour and mixture temperature. These were for two conditions, that of minimum temperature for starting with a cold motor and that of minimum temperature for steady running. These curves showed that to start with a cold motor it was necessary to have a mixture temperature of from 170 to 250 degrees Fahrenheit, depending upon the richness of the mixture, the leaner the mixture the higher the tem-

perature necessary. The steady running temperatures varied with the richness of the gas from 76 to 120 degrees Fahrenheit. Normal conditions required temperatures of 220 and 100 degrees Fahrenheit.

Another set of curves showed the effect of mixture temperatures upon economy. The difference in economy for different temperatures was very marked and with conditions varying from very light to almost full load and at several speeds it was found that the greatest economy lay between mixture temperatures of 150 to 170 degrees Fahrenheit.

The last slide brought out the fact that with a kerosene mixture at 160 degrees Fahrenheit, the fuel consumption per brake horsepower-hour at different speeds was much lower than what is considered very good with a standard carburetor on the same motor under the same conditions of speed and load, but without heating. These results were under close throttling of the motor.

In the discussion following the Tice paper, W. S. Hovey spoke of the progress of the Sheffield Car Co. in injecting kerosene and even lower grade oils in two-cycle railroad and marine motors. George A. Kliesrath then described a test trip with an Overland car equipped with the new Ray Harroun carburetor. This device used kerosene which is furnished the required heat at the jet by passing all of the exhaust through it. Starting on a cold motor was accomplished by feeding gasoline to the inlet manifold during the time that the engine-starter was cranking.

The second paper dealt with a comparison of aluminum alloys. Claude E. Cox showed several charts giving the possible alloys with aluminum and the results of a large series of tests of different alloys and under varying conditions.

Motorists Coming to Kerosene Is Prediction at Indiana S. A. E. Meeting

INDIANAPOLIS, Ind., May 3.—Motorists probably will have to resign themselves to the use of the lighter parts of kerosene in a very short time. This was developed in a paper presented by Harry Tipper, of the Texas Co., before the Indiana section of the Society of Automobile Engineers recently. He stated that the demand for gasoline is increasing so rapidly that the refiner finds it difficult, if not impossible, to meet the demand of the motor industry today without resorting to all possible means to increase his supply. With all the refiners' ingenuity the total output will not take care of the situation. Mr. Tipper's paper was entitled "Motor Fuels," and in part was as follows:

Professor Magruder, of the Ohio State University, stated the other day that if all the gasoline engines in the country, now in use, were allowed to run at their rated horsepower for 2 hours a day, the gasoline supply would only last about 30 days. In other words, the gasoline engines in use could be run at their horsepower for only 1 hour a day for 330 days in a year.

There is no such thing in the refiners' mind as gasoline. That has been merely a commercial term applied to a distillate, or a fraction of the crude, which has varied from time to time, according to commercial requirements. In the old days the crude was cut so that only the very lightest part of it went into the gasoline fraction, because there was no real market, except a very small one, for that material, and the object was to cut the fraction as close as possible and throw everything that could be thrown into the naphthas. Also, because the market for naphthas was not as great as it now is, the naphthas were cut pretty close, and the marketable kerosene fraction as large as the condition would allow. As the market for naphtha grew, which it did before the gasoline market began to increase—for the uses of naphtha are many—that naphtha was cut longer and the kerosene was cut closer.

With all the refiner's ingenuity the total output of gasoline will not take care of the situation. Gasoline, as it stands today, will not supply the heavy demands which are being made upon it by the increase in the business. In October of last year some preliminary estimates of the number of cars to be built this year were probably very much overstated. One estimate was 600,000 cars. It would take 45,000,000 barrels of new crude to supply the increased demand of 600,000 cars using 1 gallon of gasoline per day each. It would take something like 875,000,000 of new facilities to bring that increase to market as gasoline.

That is new business entirely, and we can hardly supply facilities for the present demand for the fuel.

Under those conditions it is hard for the refiner to see any other possibility than the final cutting down to the kerosene fraction. If the business keeps on increasing as at present, it is inevitable, unless we make discoveries of fields upon which at present we have no information, or discover processes upon which at present we have no determinations, that we shall cut down in the fraction and take two lighter and possibly all fractions of the kerosene. As a temporary expedient, we can and are at the present time giving you a fuel which contains little or nothing of the kerosene and takes in the naphthas; but if the present rate of increase in the use of gasoline is to continue, we, ourselves, have no means of determining how long this will continue. All we can say is that under the present conditions it will be necessary to cut deeper into the heavier part of the distillate in order to supply the demand. Consequently it will be necessary to modify the carburetor to meet the physical condition which it is absolutely impossible to evade or controvert.

In the discussion it was developed that there are more gasoline stationary and motor boat engines than there are gasoline engines in motor cars; the motor car industry represents not quite half the total number.



Routes and Touring Information

South Reports Increase in Motor Touring Interest

THE motor car looms larger and larger with each succeeding year in the summer vacation plans of motor-owning Americans. And because this is so, more than for any other reason, it also is bulking big in the annual winter trips into the south of the tens of thousands of tourists who travel into winter resortland to escape the cold and bad weather of the north.

This is true also more in spite of conditions than because of them.

In winter the whole south offers everything that the motorist desires—except roads.

The climate, the hotels and the scenery are unexceptionable. But what good are any of them—without roads? The answer is too obvious to be worth the giving.

Of course it would be unfair to say that the south is devoid of good roads, for it has thousands of miles. But the miles of road to the square mile of territory would not compare favorably with Illinois or New York, Massachusetts or New Jersey. Yet despite the comparatively small mileage of paved roads in Dixie, the winter touring grows steadily.

Last season saw an increase of 136 per cent in the number of cars used in the south by tourists from the north and east. The year before saw an increase of 198 per cent over 1911.

This increase has come in spite of the opposition of many men who are interested in promoting tourist travel in the south. For instance, said Colonel Sandy Cohen, manager of the Greater Western North Carolina Association, "As far as encouraging touring to Asheville goes we don't want good roads and we don't want to encourage them. Asheville, the metropolis of western North Carolina is a tourist resort now. If motor touring in the south became popular we should be a way station. Not for us. We want people who come to stay, not those who are scattering their money from New York to Palm Beach, via Asheville."

In the face of dubious roads and a considerable amount of opposition, motor touring in the south by northerners in the winter months increases.

From the replies received from a vast number of letters sent to winter resort owners and managers, club officials, and garage owners throughout the south, it appears that for every 100 cars used in the south by northern tourists in the winter season of 1911-12, there were 236 used in 1912-13.

Not a resort in Dixie reported any fall-

By Percy H. Whiting

ing off in the number of cars used by tourists last winter over the winter before, while several reported increases which figured up to 500 and 600 per cent.

A vast majority of cars used by tourists in the south each winter are sent down by express or freight. The number driven down in the season just closed was a trifle more than twice that of the previous season.

Hints for Eastern Tourists

MOTORISTS traveling East should remember that going from Lawrence, Mass., toward Haverhill they should use extreme care at all cross streets crossing Jackson between Essex and the Knox street garage. An officer stands constantly at Park street, and recently has been stopping motorists and warning them to sound their horn and run slowly. Traps have been measured off on Jackson street, as above, the first one commencing at the first bridge when going on Jackson street from Essex and includes Park street. The second starts just before reaching Park street, and terminates a short distance beyond the Knox street garage.

The police authorities of Newton, Mass., have established a motorcycle patrol covering Commonwealth avenue both day and night, and while the authorities of Newton always have been reasonable and fair in the enforcement of the law, and doubtless will continue to be so, they are determined to stop the excessive speeding which has heretofore been allowed on Commonwealth avenue.

The police of Cambridge, Mass., are enforcing strictly the law which requires the rear lamp to be so placed that when lighted it will display the registry number in such a manner as to make it legible at a distance of 60 feet.

To travel faster than 20 miles per hour on the metropolitan park system of Massachusetts is conclusive evidence of a violation of the rules of the park commissioners, and punishable by a fine not exceeding \$20. The defense which can be put upon other highways of the state that the operator was driving reasonably and properly is not available in complaints for violation of the park rules of the metropolitan park commission. The police have begun an active enforcement of this law.

Warning of speed traps as follows:

BOSTON, MASS.

TREMONT STREET—Between Park street and Keith's theater. Trap for exceeding 15 miles an hour between 7 and 10:30 p. m.

BEACON STREET—From Massachusetts avenue to Arlington street. Traps going both ways. Keep down to 15 miles and sound horn at corners.

On approaching corner at Charlesgate east slow down and sound horn. Between railroad bridge and Audubon circle keep down to 15 miles an hour.

COMMONWEALTH AVENUE—Trap between Charlesgate east and Massachusetts avenue in both directions. Between Massachusetts avenue and Arlington street slow down and blow horn upon approaching all intersecting ways. Trap is worked from 7:30 to 10:30 p. m. Between St. Mary's street and the Jewish temple, slow down and give signal on approaching intersecting ways.

COLUMBUS AVENUE—Between Berkeley street and Massachusetts avenue several $\frac{1}{4}$ -mile traps. Do not exceed 15 miles and sound horn at all intersecting ways. Between Camden street and Roxbury crossing several speed traps for exceeding 15 miles upon approaching crossings and failing to give timely signal.

Smoking cars are frequently stopped on Beacon hill and elsewhere in the congested parts of the city. Rear number plates should be illuminated so as to display registered number 60 feet away.

Figures as to the number used in the south that are driven down are a trifle confusing, but it would probably not run over 3 per cent. The other ninety-seven out of each one hundred come all or part of the way south by rail. Probably not over 1 per cent go north again under their own power.

For those who are coming south between October and January there probably is no reason why, with average luck, they could not drive their cars south and profit by the trip. The roads of the National highway and the Capital-to-Capital highway are excellent in dry weather. If the tourist starts south with a determination to ship from the first point where real mud is struck he can count on a pleasant journey.

After the winter rains set in—in fact from January 1 to March 31—touring should be confined to paved roads. The National highway becomes, in part, the Northern quagmire, and touring is a nightmare.

The available information on the question of road improvement is incomplete but all that is available is encouraging. Southern roads these days are dotted with convicts, engaged in construction and up-keep work and building real roads. Statistics from the various resorts indicate that the amount of paved road available within a radius of 50 miles has shown an average increase in the last twelve months of something like 25 per cent.

It is worth something that garage accommodations in connection with resort hotels are available, for the guests have increased about 60 per cent in the last 12 months. This seems to indicate a healthy growth in southern touring, for garages do not multiply unless there is real business to justify it.

Several interesting points cropped out in connection with the investigation of touring conditions in the south during the past winter.

For instance at Pinehurst and a couple of other resorts where the wealthy foregather, there was a strong demand for low-priced cars on the part of car owners who did not bring their machines South with them. These people bought cars, used them during their stay in the south and sold them for what they could get when they were ready to return home. This was possibly somewhat more expensive than renting a car or shipping one south, but it combined many advantages, which, to those to whom money was a matter of no great importance, made it

the most desirable method of solving the winter motoring problem.

Probably Leonard Tufts, owner of Pinehurst, has done more than any other man toward encouraging southern touring. Mr. Tufts writes, "The road from the Virginia line to Florida, by the Capital highway, is now passable practically any time in winter. Considerable improvements will be made before next winter. I had Mr. Westgard, the A. A. A. scout, mapping out the roads within a radius of 50 to 60 miles from Pinehurst and he reported 1,500 miles within that radius in fairly satisfactory condition.

Mr. Tufts reports a curious feature about the roads in North Carolina. He says, "I have spent a good many thousand dollars in getting a road from Pinehurst to Fayetteville and from Pinehurst to Cheraw, S. C., thinking the people would enjoy trips over them. I have urged all the motorists who have been at Pinehurst to take the trip but practically none of them has done it. Those very few who have made the trips found the roads good and thanked me for the advice."

The beach courses have proved a big attraction to car owners this past season—more so than ever. The famous Florida beaches, and that at Galveston, now a successful resort, have been in use more than ever before.

The Texas resorts, by the way, are already considering the possibility of very considerable business in 1915 as a result of the touring to the Pacific coast for the San Francisco exposition. George R. Benton of the Paso del Norte hotel of El Paso, writes, "There will be an enormous traffic in 1915 through the south en route to the exposition at Frisco."

Winter touring in the south is coming—very, very slowly it is true, but very surely. The country is large, the roads are long and the states poor. If you compare the taxable values and the miles of road of Georgia, say, with those of Massachusetts, you will marvel that Georgia has any roads at all. But it has and they are being improved steadily. The same is true of every southern state.

Touring Evolves a Home on Wheels

WITH the object of making it possible to tour the desert or any other inaccessible and thinly settled part of the country, where hotel accommodations are few and inferior, and of rendering a touring party absolutely independent of railroads and hotels, W. J. Burt, of Los Angeles, Cal., has built a car in which a party of four persons or fewer can ride, eat, sleep and do their cooking; in short, can live in perfect comfort on a trip of any length.

The chassis of the car is a regular touring model, but the body is of special construction. It has a straight-backed front seat extending the full width instead of being divided into two bucket seats as is customary. The back of this seat is hinged at the bottom, and when let down toward the rear it completely fills the space between the front and rear seat cushions. A padded fall, upholstered in the same style as the seats, is hinged to the forward edge of the front seat and can be raised to a level with the seat cushions, where it is held in position by twin supports which, when not in use, fold up out of sight. By this arrangement a bed is made, the full width and length of the body. The cushions are upholstered with springs and the finest hair tufting covered with soft leather.

A dresser-type trunk, dustproof and waterproof and especially designed by the builder of the car, is carried on a rack at the rear of the car and contains a full supply of blankets, quilts, sheets, pillows and pillowcases. Storm curtains are so arranged that the car can be completely enclosed. Small windows in these curtains admit light and give a view of the outside world, while they can be shaded when desired by small drop curtains that button to the storm curtains and thus insure as much privacy as in the bedroom of a hotel or a compartment of a Pullman sleeper.

Four 6-candlepower tungsten electric lamps with reflectors flood the interior with light. They are attached to the bows of

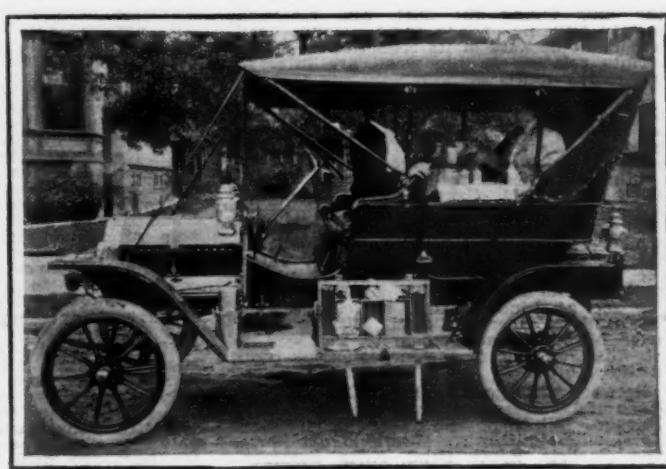
the folding top and are fed from a storage battery. A dynamo, to run on one axle and with which to charge the storage battery, is being experimented with at the present time, and when this is made available the motorist will be independent of the charging station.

On cold nights, heat can be supplied to the interior by a small gas stove fed from the Prest-O-Lite tank and which also can be used for cooking. Preparations for retiring, including the closing of the car, getting out bedding, making up the bed and lighting the interior, can be made in a few minutes, and the tourists, although they may be miles from any human habitation, find themselves as comfortable as if in their own beds at home.

All conveniences for dressing are found in the car when the travelers arise in the morning. Their clothing has been hung in two hammocks stretched from the bows of the top. When the bedding is removed and the back of the front seat raised into position, a folding dresser appears, the lid of which lowers to a horizontal position, forming a dressing table wide enough for the use of two at a time. Another lid is raised and a fine French plate mirror is disclosed. This can be tilted into any position desired, and beside it are leather pockets containing toilet accessories. The tonneau seat, of course, forms a seat for those who are using the dressing table and the mirror.

The toilet completed, the bed made up, and the bedding repacked in the trunk at the rear of the machine, the back of the front seat is lifted out and turned over with the rear side uppermost, forming a folding table that rests between the front seat and the tonneau seat, giving abundant room for the seating of four persons around it.

An imported basket or hamper, containing a full set of dishes for four, silverware, sandwich boxes, glasses, table linen, bottles and other accessories of the table, is carried on the left-hand running board. And securely fastened to the side of the



THE COMBINATION CAR SHOWING THE BED ARRANGEMENT AND ALSO THE TABLE FACILITIES

body is also a dustproof and waterproof box containing aluminum cooking utensils. The small gas stove, already mentioned, can be attached to a tube within the tonneau and used on the dining table, or it can be set up on the ground if the weather is quiet enough for cooking to be done outside. Water is carried in a large tank under the car.

When all preparations are complete, and

breakfast, or any other meal, is prepared, a party up to four persons can eat in comfort within the machine. If necessary, owing to inclement weather, the entire meal can be prepared and eaten within the curtained tonneau.

Space for food supplies, etc., is afforded under the rear seat, where compartments are provided for the purpose. An additional water tank can be carried lashed to

the running board of the car. This is especially convenient in event of a long run across the desert or in other waterless country.

Equipped with one of these cars, a party is able to see country to which the railroads and tourist hotels have not penetrated and which, without the car, must otherwise remain forever a closed book to the traveler.

Answers to Route Inquiries from Motor Age Readers

SAN LUIS POTOSI, MEX.—This year I am going to take a trip from Chicago to Austin, Minn., Mankato, St. Paul, return to Chicago, tour east to Battle Creek, Mich., Niagara Falls, N. Y., New York City, then south to Philadelphia, Baltimore, Washington, D. C., then west to Nashville, Tenn. From there I would expect to ship my car to Mexico because I do not think that there are any decent roads from there on. What editions of the Blue Book or others guides would I need to travel over this territory? Where can they be secured?—J. Paulson.

The Chicago-Clinton, Ia., road of 148 miles is easily followed through Maywood, Lombard, Geneva, DeKalb, Creston, Rockwell, Ashton, Franklin Grove, Dixon, Sterling, Morrison, Fulton and Lyons. The next day 149 miles travel will find you in Waterloo, Ia., stopping for noon lunch at Cedar Rapids, making the run through Elvira, DeWitt, Grand Mound, Wheatland, Clarence, Mechanicsville, Lisbon, Mt. Vernon, Cedar Rapids, Shellsburg, Vinton, Mt. Auburn, La Porte, and Washburn. In dry weather a fairly good level road leads to Austin a distance of 105 miles through Janesville, Waverly, Mashua, Charles City, Mitchell, St. Ansgar, and Lyle. You can reach Mankato over fairly good roads if it happens to be dry weather by motorizing 106 miles through Albert Lea, Alden, Blue Earth, Winnebago, Amboy, and Garden City.

To reach St. Paul take the road running through Janesville, Waseca, Owatonna, and north through Medford, Faribault, Dundas, Northfield, Farmington, and Rosemount. Summit avenue is the principal residence street and its location along the bluff permits of excellent views of the surrounding country. Dayton's Bluff is a view point and interesting because of its Indian mounds. Carver's cave, the state fish hatchery, Lake Como, Fort Snelling, Minnehaha Falls, are places to be visited and popular summer resort lakes within easy driving distance are White Bear, Bald Eagle and lake Minnetonka.

Returning to Chicago you might go through Wisconsin, reaching La Crosse at a distance of 162 miles by routing through Cannon Falls, Wastedo, Zumbrota, Pine Island, Rochester, Dover, St. Charles, Lewiston, Stockton, Winona, Witoka, Ridgeway, and La Crescent. Take a trip to Grandad Bluff reached through Dixon Forest over part of the park system. The next day's run of 146 miles takes you to Madison, beautifully located between Lake Mendota and Lake Monona. The intermediate towns are St. Joseph, Portland, Cashton, Ontario, Kendals, Elroy, Union Center, Wonewoc, Reedsburg, Abelmans, Baraboo, Sauk City, Ashton. The campus of the University of Wisconsin, situated among the hills facing the lake, and historical society building in the same neighborhood, important because of its collection of manuscripts relating to the west, are interesting to the tourists.

A gravel road will take you to Lake Geneva in time for lunch the following day by traversing 78 miles through Stoughton, Edgerton, Janesville, and Delavan, taking a 20-miles drive around the lake, then proceeding to Chicago through Hebron, Greenwood, Ridgefield, Crystal lake, Algonquin, Elgin, Otarville, Addison, Oak park and Garfield park. Public buildings which should be inspected are the Art institute, the public library, Marshall Field's store, the Board of Trade, and a trip should be made through the stock yards, through the zoo at Lincoln park, a drive can be taken along Sheridan road, passing block after block of fine homes on the way to Ft. Sheridan, one of the largest army posts in the states.

Between Chicago and Battle Creek, a distance of 193 miles, you travel through South Chicago, Whiting, Hessville, Schererville, Merrillville, Valparaiso, Westville, La Porte, New Carlisle, South Bend, Niles, Summerville, Dowagiac, Paw Paw and Kalamazoo. Paw Paw is a popular summer resort and Kalamazoo lays claim to being the chief

Mexican Outlines Tour Plans

paper manufacturing center in the world. Celery is grown in very large quantities in this vicinity, and these gardens are well worth seeing. Battle Creek is widely known for its health sanatorium, and the manufacture of cereal foods.

A direct line takes you to Detroit and through Canada to Niagara Falls. Traveling through Marshall, Albion, Jackson, Chelsea, Ann Arbor, Ypsilanti, Wayne and Dearborn lands you in this large manufacturing center. It ranks first in the production of motor cars, and these large plants are seen no matter where you turn. It will only be necessary to spend two days in Canada, therefore you will not need to take out a license. A stop will have to be made at the United States custom house, going through the regulation requirements and also at the first Canadian custom house across the line where a permit is secured without any charge.

The first day in Canada is to London a distance of 142 miles passing through Windsor, Ruthven, Wheatley, Blenheim, Ridgeway, and Lambeth. The second day a 152-mile travel will see you in the states again at Buffalo, passing through Thanesford, Ingersoll, Woodstock, Oxford, Brantford, Lancaster, Hamilton, Grimsby, Jordan, St. Catherines, Homer, St. Davids, Niagara Falls and over the boulevards to Buffalo. Through some small towns, Bowmansville, Crittenden and Curf, you arrive in Batavia, then follow the main highway through Leroy, Caledonia, Mumford, and Scottsville to Rochester, 17 miles, and on through Pittsford, Mendon, Canandaigua, Geneva, Waterloo, Seneca Falls, Auburn, Senett, Camillus, to Syracuse, 98 miles. Rochester, which is built on both sides of the river, is connected by ten bridges and thus affords many fine views of the Genesee. Practically all the film cameras now used are manufactured here, a well-known one being the Eastman kodak. Modern spiritualism had its birthplace at Hydesville, a suburb of this city. The famous Fox sisters, whose homestead is still standing, gave the first mysterious manifestations, and for many years these exhibitions were known as "Rochester knockings." The principal industry in Syracuse is the manufacture of salt secured from salt springs in the marshes around lake Onondaga. The Erie canal runs through the very heart of the city and considerable traffic is done on it.

Albany, N. Y., is the next day's destination and is 145 miles. Manlius Center, Mycenae, Chittenango, Wampsville, Sherill, Vernon, Kirkland, and New Hartford lead to Utica, from which city pleasant drives can be taken to Cooperstown on Otsaga lake, Trenton Falls, Oriskany Falls, Richfield Springs, Sharon Springs, and the Masonic home is located to the east. Utica is the center of the American cheese trade. If the trunk line to Albany through Deerfield, Herkimer, Little Falls, St. Johnsville, Nelliston, Palatine Bridge, Fonda, Tribes Hill, Amsterdam, and Schenectady is not in condition when you pass that way it would be advisable to cross to the south side of the Mohawk river and canal to Fort Plain, taking the state road east to Fultonville, thence back to the other side of the river to Fonda and Amsterdam, recrossing to the south side and routing through Minaville, Scotchbush, Marlville, and Schenectady. Many fine examples of Indian arts and crafts, pottery, etc., have been unearthed at and near Fonda, and in pre-colonial days the Mohawks and their ancient enemies, the Mohicans, contested the ownership of the valley at Tribes Hill. Next to Johnstown, Amsterdam is probably the most interesting town in the valley from the point of view of interesting relics that remain of the epic days. By far the most interesting sight in Amsterdam is the old stone house, Fort Johnson,

built in 1754 by General Johnson, the remarkable man whose genius did so much to develop the Mohawk valley. He was nearer to the Indians than perhaps any white man that ever lived, as he was elected chief of the Mohawk tribe, and many picturesque events took place in this house. In Schenectady there are many interesting old houses, among them the quaint old Dutch church, which possesses a silver communion service presented to the original chapel by Queen Anne, the campus and buildings of Union college founded in 1785, and not far distant the ancient Jan Mabie house built of buff brick and stout dutch tiles in 1680, and now the oldest homestead in the valley. At Albany the state capitol building, erected in 30 years at an enormous expense, with its magnificent staircase, also Fort Crailo, formerly the historic manor house where Yankee Doodle was written, should be visited.

The travel the next day is devoted to the Albany-New York post road built over 300 years ago, and because of the enormous amount of traffic which it receives, the road conditions are bad most of the time. This road is followed as far as Fishkill landing through Rensselaer, Schodack Center, Kinderhook, Stuyvesant Falls, Stotsville, Hudson, Red Hook, Rhinebeck, Hyde Park, Poughkeepsie, and Wappinger Falls, then it is best to ferry to Newburg and enter New York through Central Valley, Arden, Southfield, Tuxedo, Suffern, Hohokus, Hackensack, and the Fort Lee ferry to 130th street.

There is so much to be seen in New York that it is hard to pick out the most important places, but one ought not to leave the city without visiting the museum of art, the museum of natural history, the stock exchange on Wall street, the zoo at Bronx park; then there is Coney Island, a trip over Riverside drive, and naturally the highest building in the world, the Singer building, should be seen. A drive through Long Island over the parkway might also be included.

Upon leaving the city, take the Weehawken ferry at West 42nd street and arrive at Newark, then Elizabeth, where the Princeton university was first located. Here there is an old tavern where Washington stopped on his way to New York for his first inauguration, and Gen. Winfield Scott's home, the Boudinot house, and the old Livingston mansion still stand. Rahway, Metuchen, New Brunswick and Kingston are routed through on the way to Princeton, which is now the home of the university. Nassau Hall is one of the great historic buildings of America. Other landmarks of revolutionary days in Princeton are Prospect and West buildings, and also the Nassau Inn, formerly the old Jolins hotel, one of the most famous hosteries in the country. In the town are many beautiful residences dating back to the days of the Royal Jerseys. The battlefield of Princeton is about 1 1/4 miles from the center of the town on the road to Trenton. Princeton cemetery is called the Westminster Abbey of America, and many famous men are buried here. Tusculum, the home of John Witherspoon, who is buried in the Princeton cemetery, still stands unchanged externally. The routing through this wonderfully historic country is brought to Trenton where on that Christmas morning, Washington, taking advantage of the Hessians' Christmas revelry, crossed the Delaware and gained a victory in 30 minutes. This event has been commemorated by a memorial shaft surmounted by a statue of Washington erected at the old Five Points. Most prominent of all in Bordentown is the Bonaparte park, once the home of Joseph Bonaparte, ex-king of Spain, and brother to Napoleon. This house was connected with Lake Villa by an underground passage which extended to the river bank, where the entrance may still be seen. The original Bonaparte house is gone, but there are four of the houses of the Lake Villa remaining, although in a very dilapidated condition. The Hop-

kinson house still stands and one will remember this name as being coupled with Hall Columbia, written by the son while residing in Philadelphia. The ancient house where Washington had his headquarters after his famous Trenton battle stands just beyond Bordentown. Thirteen miles further will find you in Burlington, the home of James Fenimore Cooper, author of the Last of the Mohicans, whose old home is still standing. The James Lawrence house adjoining is also a land mark.

Through Bridgeboro to Camden then the ferry, and the birthplace of our freedom is entered. The room on the east side of the main entrance of old Independence Hall where the Declaration of Independence was adopted has never been altered. The world wide famous Liberty bell is housed in this hall, and it is doubtful if it ever will be taken from its present support. The Walnut street theatre, founded in 1808, is the oldest in America. The old Betsy Ross house where the flag of 13 stars and 13 stripes was made for our national ensign is open to visitors. It is in Fairmount park that important road races were held up to 1911.

Philadelphia to Baltimore is 108 miles routing through Darby, Village Green, and Chelsea, crossing the Brandywine into historic Wilmington, where the Glen should be visited. Leaving Delaware at Newark route through Elkton, Perryville, Havre de Grace, noted for its shad fisheries, Churchville, Belair and Towson. Druid Hill is a 700-acre tract with a great variety of trees beautifully displayed among the drives and is one of the prides of this city. Baltimore, Relay, Laurel and Bladensburg route to Washington. The National capitol grounds, government buildings, Cabin John bridge, the second longest covered bridge in the world, the Great Falls of the Potomac, Mt. Vernon, Washington's home, open to tourists, Arlington cemetery, Rock creek park, an area of 1,600 acres, are not all of the sightseeing points of this vicinity.

Winchester, Va., one of the most historical towns in the Shenandoah valley, is reached through Bethesda, Rockville, Gaithersburg, Prince Orchard, Leesburg and Berryville. Sheridan's famous ride of 12 miles to Cedar Creek is connected with the thought of Winchester. Next comes the stretch to Staunton, over this valley pike road passing through Middleton, Woodstock, Edinburg, Mt. Jackson, New Market, Harrisonburg, Mt. Crawford, Burkstown, and Verona, then on to Roanoke, 89 miles through Greenville, Midway, Fairfield, Lexington, Fancy Hill, Natural Bridge, Buchanan, Troutville, Cloverdale and Roanoke. Natural Bridge is an arch spanning the ravine of the Cedar creek and is surrounded by land originally owned by Thomas Jefferson, who built a log cabin there for the use of visitors. It is still attractive to tourists. From the top of Mt. Jefferson the peaks of Purgatory mountain and the Blue Ridge can plainly be seen.

Leaving the National pike slow stages takes you through Salem, Elliston, Christiansburg, Radford, Fukaski, Max Meadows, Wytheville, Rural Retreat, Marion, Chilhowie, Meadow View, Abingdon and Bristol, a distance of 152 miles. The Bristol-Chattanooga road, mostly all pike extends through Indian Spring, Kingsport, Rogersville, Morristown, Jefferson City, Knoxville and Rockwood, where a direct road leads to Crossville, Sparta, Smithville, Murfreesboro and Nashville, or a longer route, also more interesting, can be taken through Spring City, Dayton, Retro, Chattanooga, Jasper and Murfreesboro. The scenery you will see on this trip will always be remembered.

You are perfectly correct in sending your car by freight the rest of the way. The country would hardly interest you after such a trip. Blue Books which you will need are volumes 5, 4, 1 and 3 in their order mentioned, and each will cost you \$2.50 and procurable from the Automobile Blue Book Publishing Co., Karpen building, Chicago.

St. Paul to Cornwall, Ont.

St. Paul, Minn.—Editor Motor Age—We are going to take a trip east in June and plan on the following route as shown on the map, page 19 of the March 13 issue. It is necessary to stop at Cornwall, Ont., so we could only follow that as far as Buffalo, so what we would like is the best way to get from Buffalo to Cornwall. Could we go by boat? Would an entirely different route than outlined in that map be better for us? We would like a suggestion for a 2 or 3 weeks' trip from Cornwall which would include places, best scenery and roads, to Boston, New York, and if it did not stretch out too long to Washington, D. C.

Not being familiar with the country makes it very hard to plan a trip. I should like to know of such guide books that will be useful on the trip. I have the Scarborough Minnesota guide which shows all the routes from here to Chicago.—F. E. Stokes.

Follow the route as far as Syracuse in-

stead of Buffalo, and travel through Cicero, Brewertown, Hastings, Colosse, Maple View, Pulaski, Richland, Watertown, Theresa, Redwood, Hammond, Morristown and Ogdensburg, 137 miles. Cross the river to Prescott, being sure to register with the United States custom officer, then with the Canadian custom officer across the border where you secure your touring privilege. A pretty poor road lies the 50 through Cardinal, Iroquois, Morrisburg and Aultsville.

Returning to Syracuse we would refer you to the information given the San Luis Posoli communication for the balance of the directions. To go through the New England country, however, you would go to Pittsfield, Mass., from Albany, then to Springfield and Worcester to Boston, and to New York by way of Providence, New London, New Haven, Bridgeport, Port Chester, White Plains and Yonkers.

By using Blue Books 4, 1, 2 and 3 you will have running directions of the entire trip and many side jaunts to places which you ought to visit when in their vicinity.

Shreveport, La.-Oklahoma City

Shreveport, La.—Editor Motor Age.—Can Motor Age give us the road routing from Shreveport to Oklahoma City, Okla.?—A. Currie, Jr.

Routing to Texarkana you will have 217 miles to travel to Dallas, passing through Leary, Boston, DeKalb, Annona, Clarksville, Detroit, Blossom, Paris, Brookston, Hightown, Petty, Honey Grove, Dodd City, Bonham, Whitewright, Pilot Grove, Sedalia, Anna Melissa, McKinney, Plano and Richardson. The balance of the travel through Texas is first to Dallas, 33 miles through Grand Prairie, Arlington and Handley, then to Wichita Falls, 142 miles, through Ben Brook, Aledo, Annetta, Weatherford, Adell, Whitt, Jacksboro, Antelope and Windthorpe. At Burkhardt cross the river into Oklahoma and route through Randlett, Emerson, Lawton, Apache, Anadarko, Verden, Chickasha, Pocasset and El Reno.

Kentuckian Plans a Tour

Bevier, Ky.—Editor Motor Age.—I am thinking of making a tour about the middle of May from here via Nashville, Tenn., Chattanooga, Atlanta, Ga., to Savannah, returning to Chattanooga, thence Knoxville, Cumberland Gap, Middlesboro, London, Lexington, Frankfort, Louisville and Bowling Green, Ky., to Bevier. Kindly advise if I will meet with any very bad road on this route, and give any other information regarding the route that you may be able to give.—W. McCandless.

You will be able to reach Cumberland Gap, but there you will have to stop. The Blue Book advises that you will not be able to get across the mountains to Middlesboro and reach London. There isn't any possible way a car can drive into London.

You can get to Nashville through Hopkinsville, Clarksville and Ashland City then to Chattanooga, 247 miles from Nashville, through Murfreesboro, Shelbyville, Fayetteville, Meridianville, Huntsville, Mayfield, Paint Rock, Larkinsville, Scottsboro, Fackler, Bridgeport, Jasper, Rankin's ferry over the Tennessee river to Chattanooga, noted in history for the battles of Lookout Mountain and Chickamauga. Going 143 miles to Atlanta your pathway leads through Lafayette, Summerville, Rome, so named because of its seven hills, Cartersville, Acworth, Kennesaw and Marietta. The Gate City of the South, as Atlanta is popularly known, has numerous points of interest which can be reached by splendid drives. There are battlefields which completely surround the city. Fort McPherson, one of the most complete of the modern military posts in the country, etc. Over mostly improved gravel

Wisconsin Speed Traps

COMING from the Milwaukee Automobile Club is the warning that the police department has on duty one uniformed motorcycle policeman, who confines his activities to upper Grand avenue; and five to seven plain clothes motorcycle policemen, on duty as such 3 or 4 days a week, who watch the principal boulevards and thoroughfares of the south, southwest, north and northeast sections of Milwaukee. They will be on duty regularly in about 2 weeks' time. The speed limit is 15 miles per hour.

The sheriff's department of Milwaukee county has on duty one plain clothes deputy daily, and two to three on Sunday. The regular motorcycle deputy is watching Grand avenue boulevard beyond the city limits, as well as State street, a new concrete highway, paralleling Grand avenue. Both run westerly from Milwaukee. On Sunday the extra deputies scour the new concrete roads known as Janesville plank, Chicago road, Kinnickinnic avenue and the main-traveled thoroughfares north, northwest and northeast. The speed limit is 25 miles per hour.

roads, the 171 miles to Augusta is by way of Decatur, Ingleside, Stone Mountain, Redam, Lathonia, Covington, Social Circle, Rutledge, Madison, Greensboro, Union Point, Crawfordville, Camak and Bonesville. Meadow Garden is an interesting house in Augusta which is a museum containing colonial and revolutionary relics, and St. Paul's church, built on the site of Gen. Oglethorpe's Fort Augusta, is a very delightful old edifice. The shaded wide avenues will be noticeable and the suburb of Summerville, a winter resort, should be paid a visit.

Between Augusta and Savannah, with the exception of about 60 miles, you will find fine gravel road through Waynesboro, Perkin, Millen, Scarboro, Rockyford, Statesboro, Stilson and Eden. Some miles out of Savannah at Bethesda is a Sunday school 150 years old which is still used. The green house in which General Sherman made his home during his stay in the city at the time of his march to the sea is still standing. It is one of the show places of Savannah. A few miles south will be found the Hermitage, the most perfect example possible of a colonial plantation, with its slave quarters, now tenanted by free-men. On Tybee Island, at the mouth of the river, is found Martello Tower, a mysterious structure of which little is known. It was there when Gen. Oglethorpe arrived and was probably built by Spaniards from Florida. It is at Savannah that the Vanderbilt and Grand Prize races are to be run once more, and a spin should be taken over this course.

Retracing the route to Chattanooga a fine pike road extends to Retro, Dayton, Spring City, Rockford, Kingston, Eatons cross roads and Knoxville. Cumberland Gap is reached from Knoxville, as is also Bristol, which is a most beautiful trip through Straw Plains, New Market, Jefferson City, Morristown, Russellville, St. Clair, Rogersville, Amis, Yellowstore, Surgeonville, New Conten, Church Hill, Sollitude, Kingsport, Edens Ridge and Indian Springs.

A return to Knoxville can be made from Bristol through Bluff City, Piney Flats, Johnson City, Jonesboro, Greenville, Beulah Springdale, Morristown and Jefferson City.

The entire distance from Chattanooga to Bristol, 236 miles, is one continuous panorama with towering mountains on either side, and first class hotels located at all points between Chattanooga and Knoxville and at Morristown, Tate Springs and Rogersville. At Bristol an ascent of 5,000 feet to Flint rock will give a view of the surrounding country for 50 to 60 miles in all directions, and from High Point, about 1½ miles away one can see into North Carolina, Virginia, Tennessee and Kentucky.

Clarion, La.-Monroe, La.

Clarion, La.—Editor Motor Age—Please give me the best route to Monroe, La. What is the average cost per gallon of gasoline?—C. DeV.

From Fort Dodge route to Grand Junction, a distance of 39 miles, where you will take the Iowa transcontinental road to Omaha, 144 miles, through Jefferson, Scranton, Ralston, Carroll, Arcadia, Denison, Arlon, Dow City, Dunlap, Woodbine, Logan, Missouri Valley, Reel's Store and Council Bluffs. This is a dirt road the entire distance, and good in dry weather.

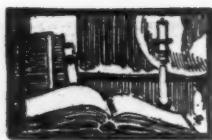
With the exception of the first 10 miles, which are macadam, the route to the point where you intersect the Meridian highway at Fairmont is dirt, fairly good. The distance to this town is 124 miles and the itinerary Millard, Gretna, Ashland, Waverly, Havelock, Lincoln, Emerald, Milford, Friend and Exeter.

Turning south at this point, for the balance of your trip you will have few fair roads, and mostly indifferent or bad. It will take you 245 miles to reach Wichita, Kans., traveling on the Meridian road through Brunning, Belvidere, Hebron, Chester, Belleville, Concordia, Minneapolis, Salina, Bridgeport, Lindsborg, McPherson, Moundridge, Trueblood and Newton.

Wellington, South Haven and Caldwell will take you to the Kansas-Oklahoma state line, the first town in Oklahoma being Renfrow, then Medford, Pond Creek, Kremlin, Enid, Waukomis, Hennessey, Dover, Kingfisher, El Reno, Pocasset, Chickasha, Verden, Anadarko, Apache, Lawton, Emerson, Randlett. This distance is 255 miles.

Crossing the Red river over a toll bridge, you continue to Burkhardt, Wichita Falls, Windthorpe, Antelope, Jacksboro, Adell, Weatherford, Annetta, Aledo and Ben Brook to Fort Worth, being 169 miles. Fort Worth to Dallas is 33 miles over a well traveled road through Handley, Arkington, and Grand Prairie, and the run to Texarkana, 217 miles, will be through Richardson, Plano, McKinney, Melissa, Anna, Sedalia, Pilot Grove, Whitewright, Bonham, Dodd City, Honey Grove, Petty, Hightown, Brookston, Paris, Elossom, Detroit, Clarksville, Annona, DeKalb, Boston, New Boston and Leary.

The run down to Shreveport and across to Monroe will necessitate local inquiry.



The Readers' Clearing House



GEAR RATIO OF CUTTING GIVEN

Speed of Model B-40 and Make of Motor Used—Starter Data

DETROIT, Mich.—Editor Motor Age—Can Motor Age give me information relative to the Jesco electric starter? How fast will it spin a 40-horsepower motor? What voltage does it require and will it pull the car on low speed?

2—What is the speed and rear ratio of the model B-40 Cutting?

3—What motor does the Cutting Motor Car Co. use?—Subscriber.

1—This was given in Motor Age, issue of April 17, page 31.

2—The maximum speed of the Cutting 40 is 53 miles an hour. The gear ratio is 3.00 to 1.

3—The Wisconsin motor, manufactured by the Wisconsin Motor Mfg. Co., Milwaukee, Wis.

GASOLINE AND KEROSENE IN FORD

Mixture Not to Be Used—Master Vibrator Helpful on Ford

Demopolis, Ala.—Editor Motor Age—Please advise me as to whether it is practicable to use a mixture of, say 5 gallons of gasoline and 1 gallon of kerosene in a Ford car. I have a friend here who is using the above mixture very satisfactorily in a Cross-Country Rambler. Does Motor Age advise the use of a master vibrator on a Ford car, and if so, what make is recommended?—J. R. Howze.

1—A mixture of kerosene and gasoline is not recommended for use in a Ford motor. Although some owners have obtained good results while the motor is hot, most of those who have tried this combination have had much trouble in getting the motor started. Motor Age is of the opinion that gasoline alone will give better results than a mixture of it and kerosene.

2—The Ford company does not advise the use of a master vibrator to replace the four unit coils. These coils are efficient for the Ford car and the addition of a master vibrator brings a part into the motor for which it was not designed. Many owners have fitted their cars with master vibrators and have obtained good results, while others have found that the four unit coils supplied with the car have given better satisfaction. It is not customary for Motor Age to recommend any particular make of device. It would be well to ask the local Ford agent what make of master vibrator the majority of owners are using.

CLEANING MOTOR WATER-JACKETS

Reader Wants Range of Displacement for Schebler Carburetor

Denver, Colo.—Editor Motor Age—1—Please advise me what solution there is that can be used for the purpose of cleaning out the water-jackets and radiator after using a car for some time, especially where alcohol and glycerine have been in use to prevent freezing.

2—What is the approximate range of piston displacement for which a Schebler model L carburetor of 1 inch size satisfactorily will furnish a mixture; also a 1 1/4 inch?—J. E. Barker.

1—Ordinary washing soda mixed with water will remove the gelatinous deposit.

Questions Answered and Communications

J. R. Howze.....	Demopolis, Ala.
Subscriber	Detroit, Mich.
J. E. Barker.....	Denver, Colo.
J. S. Adams.....	Detroit, Mich.
A. Subscriber.....	La Rue, O.
P. G. Liederbach.....	Buffalo, Minn.
S.....	Monroe City, Mo.
Dr. J. Alex Meldau.....	Newberry, S. C.
Trent G. Anderson.....	University, Va.
Ted Campbell.....	Virden, Ill.
Stanley Anderson.....	Kewanee, Ill.
G. W. Swarting.....	St. Louis, Mo.
A. Subscriber.....	Nelsonville, O.
F. T. Hill.....	Baltimore, Md.

A strong solution should be made, using about 1/2 pound of the soda. The motor should be run with this solution in the radiator for 1 hour, after which it should be drained and clean water substituted. This clean water should be drained and fresh water put in again. Fresh water should be drained and replaced 4 or 5 times. The operation is necessary to clean the jackets thoroughly.

2—The 1-inch model L Schebler is designed to operate satisfactorily on a four-cylinder motor up to 4-inch bore and 4-inch stroke, or one of 201.1 cubic inches piston displacement. The 1 1/4-inch model is to be used up to 4 1/2 by 5-inch motor or one with a displacement of 318.1 cubic inches. It does not follow, however, that these types of carburetors will not operate efficiently on motors of other dimensions, for the design of the motor must be considered.

IS TRULY AN EMERGENCY BRAKE

Detroiter Finds Name Applied to Hand Brake No Misnomer

Detroit, Mich.—Editor Motor Age—I have read that the term emergency brake, as applied to the hand brake, is at least a misnomer. I beg to offer my opinion, as in my experiences I have found emergency a fit name. For instance: Our car had just been repaired, new control lever

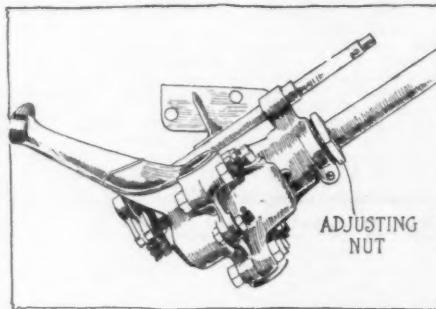


FIG. 1—SHOWING ADJUSTING NUT OF E-M-F STEERING MECHANISM

applied; the quadrant showed the gear-change lever in a neutral position. My companion, after opening the throttle half-way up the sector, started to crank the motor. It started, and at the same time the car shot ahead, my companion clinging to the radiator.

Serious injury to both man and car undoubtedly would have resulted had I not jumped on the running board and, reaching inside, pulled the hand brake. The motor stalled just in time to avert a collision. In this case of emergency the service or foot brake could not have been applied unless I were seated in the car. Upon investigation it was found that while the gear lever showed neutral at the quadrant, the finger below held the second speed gears in mesh, being adjusted wrong.

I believe that the term emergency, as applied to the hand brake, is a most appropriate name, and I am inclined to believe that the readers of Motor Age will agree with me.—J. S. Adams.

TIMING A REGAL MODEL N MOTOR

Reader Given Instructions for Timing the Valves and Magneto

La Rue, O.—Editor Motor Age—I would like to know how to time a Regal model N correctly—A Subscriber.

The valves of the Regal N are timed as follows: On the rim of the flywheel there are several lines as shown in the Fig. 2. These lines represent distances in degrees from two lines, one marked 1-4, and the other 2-3. When the flywheel is turned so that the line marked 1-4 is up and coincides with the center line of the cylinders, the pistons of cylinders 1 and 4 are at the uppermost point of their strokes or at upper dead center. When the line marked 2-3 is up in line with the center line of the cylinders, the pistons of cylinders 2 and 3 are at upper dead center.

To find the center line of the cylinders, remove the water manifold from the top of the cylinders and screw out the cylinder plug from the top of cylinder 4. Turn flywheel over until the piston of cylinder 4 is just at the top of its stroke. With the piston in this position, the line marked 1-4 on the flywheel is in exact line with the center line of the cylinders. Make a mark on the cylinder at the point opposite 1-4 on the flywheel.

Open the relief cocks on top of the cylinders, then turn the flywheel to the left until the line marked 1-4 is opposite the center line of the cylinders. At this point the exhaust valve in either 1 or 4 cylinder should just commence to close. If you find that the exhaust valve in No. 4 cylinder is beginning to close and you wish to check up the valve

timing in No. 1 cylinder, turn the flywheel around to the left, one complete revolution until line 1-4 is again brought opposite the center line of the cylinder; then continue slowly turning the flywheel about one inch further to the left until the line marked 7 coincides with the center line of the cylinders. This is the point at which the exhaust valve in the cylinder 1 should just seat itself or close. To determine whether or not the valve is seated, see if tappet or push rod underneath the valve can be turned with the fingers. If the tappet turns freely, the valve is seated, but if the tappet is hard to turn, that will show that the valve is still being held slightly open. If this is the case, loosen the lock nut on the tappet screw, and turn the screw down until the valve just seats, then turn the lock nut down tight against the tappet.

To check up the timing of the inlet valve in the same cylinder, turn the flywheel to the right until the line 1-4 is in line with the center of the cylinders and then turn the flywheel about $\frac{1}{4}$ inch to the left until the line marked 5 coincides with the center line of the cylinders. At this point the inlet valve should just begin to open. Turn the flywheel half a turn to the left, stopping when the line marked 40 is in line with the center of the cylinders. At this point the inlet valve should just close. To see if the exhaust valve opens at the proper time, revolve the flywheel three-fourths of a turn to the left and stop when the second line 40, which is the first line to the left of the 2-3 center line, comes up in line with center of the cylinders. This is the point where the exhaust valve in cylinder 1 should just begin to open. The above operation completes the timing of cylinder 1.

To time cylinder No. 2, turn the flywheel until the line marked 2-3 is in line with the center line of the cylinders. If the exhaust valve in cylinder 2 is closed, turn the flywheel one complete revolution in the direction of the arrow, until the line 2-3 is up again; the exhaust valve in cylinder 2 should start to close. The procedure now is the same as with cylinder No. 1. The valves of Cylinder 4 are timed from the line 1-4 and cylinder 3 from the line 2-3.

In timing the magneto, which may have been removed previously, crank motor over until the No. 1 piston comes up on its compression stroke and stop when the 1-4 dead center line on the flywheel is opposite the center line of the cylinders. At this point the No. 1 piston is at dead center. With the No. 1 piston on dead center, place the magneto on the bracket and connect the wires. Next throw the switch over on the battery side and then disconnect the terminal from No. 1 spark plug and hold it about $\frac{1}{2}$ of an inch from the plug at the same time turning the magneto shaft with the fingers until a spark jumps from terminal to plug. At

this point the magneto is set correctly and should be connected to the gear shaft without turning the magneto shaft.

MANY CARS WITH LEFT-HAND DRIVE

Makers of Car Parts—Spark Plug Pump Information

Buffalo, Minn.—Editor Motor Age—What per cent of motor cars in this country use left-hand drive. I understand that 5 years ago there were no left-hand drives. If that is true, at what rate per year has left-hand drive been gaining?

2—What per cent of the car manufacturers use the different types of starters, namely, electric, ignition, mechanical, compressed air, and hand.

3—Can a clincher tire be used on a quick-detachable rim and vice versa?

4—On the Overland cars, models 69 and 71, the engine is timed as follows: The exhaust opens 46 degrees early and closes 15 degrees late; total period open, 241 degrees. Intake opens 8 degrees late and closes 38 degrees late; total period open, 210 degrees. It will be noticed that the intake opens 8 degrees late and the exhaust closes 15 degrees late. In this method of timing when the intake opens the exhaust gas has still 7 degrees to go before it is closed. Why is the engine timed this way?

5—Why did the Studebaker abandon the E-M-F 30 and the Flanders 20, and bring out this spring three new models, namely, 25, 35 and a six. This company claimed in the spring of 1912 that it was making 20,000 E-M-F 30s, 30,000 Flanders 20.

6—I notice the new 1914 Packard has come out squarely for the left-hand drive and it has a multiple-disk clutch which is to run dry. The Reo, made by R. E. Olds, has had these features for some time. The Reo also uses eleven Timken bearings. How many does the Packard use?

7—Who make the parts of the Michigan 40? 8—There is a tire pump that uses a cylinder of the engine for a pump and is put in the place of the spark plug. Does it not allow a certain amount of gasoline mixture to get into the tire? I am told it does not, but the intake valve is open when the piston is on its suction stroke. If it does not, I do not see what prevents it.—P. G. Liederbach.

1—Thirty per cent use left drive. In 1909 there were no cars with left drive. In 1910 2 per cent and in 1911 5 per cent and in 1912 10 per cent had left drive.

2—Electric, 37; acetylene, 14; lever, 1; spring, 3; air, 9; optional, 5.

3—Yes.

4—Motor, Continental Motor Co.; gearset, Warner Gear Co., axles, Metal Products Co.; wheels, Kelsey Wheel Co.; radiator, Hayes Mfg. Co.; bearings, Standard Roller Bearing Co.; springs, Lewis Springs and Axle Co.; steering, Gemmer Mfg. Co.

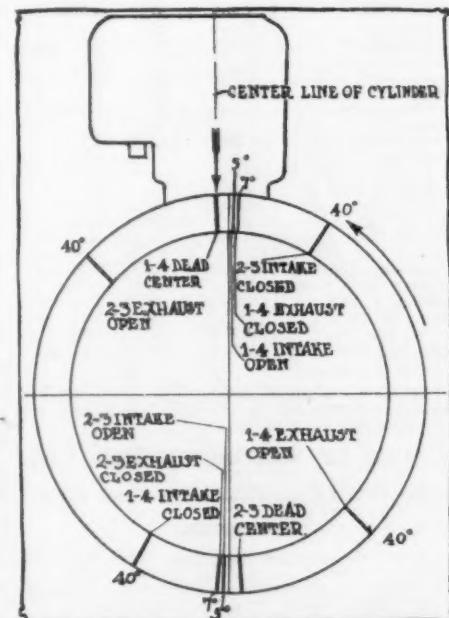


FIG. 2—TIMING CHART OF REGAL, N

5—The designers of the motor have found that by timing the motor as it is the best results are obtained.

6—The E-M-F 30 is manufactured still under the name Studebaker 30.

7—The Packard has used a multiple-disk clutch for the past 3 years.

8—Motor, Buda Motor Co.; gearset, Warner Gear Co.; axles, Lewis Spring and Axle Co.; radiator, Long Radiator Co.; springs, Hess Spring and Axle Co.

9—The construction and operation of a spark plug pump was given in Motor Age issue of April 24, page 25.

EXTINGUISHING GASOLINE BLAZE

Carbon Tetrachloride a Suitable Agent for Quenching Fire

Monroe City, Mo.—Editor Motor Age—I would like a formula for liquid chemical fire extinguisher to subdue a gasoline blaze.—S.

There are various liquids which may be used for extinguishing a gasoline blaze, chief among which is ammonia. Although this is thought to be very satisfactory in most cases, the use of carbon tetrachloride is considered by some to be ideal. This liquid may be bought at the majority of drug shops and costs in the neighborhood of 15 cents per pound. An extinguisher that has been used with success consists of two parts of common salt, one part ammonium chloride and seven parts water.

CAR WILL NOT THROTTLE ON HIGH

Buick Model 10 Has High-Speed Motor—

Car Throttles to 8 Miles an Hour

Newberry, S. C.—Editor Motor Age—If a car is geared 3 to 1, can such a car be made to run slowly enough to be safe to drive through a traffic-crowded street? If so, describe the modus operandi as to throttle and gear. Can it be done on high by a proper manipulation of the throttle?

2—I have purchased recently a used model 10 Buick which I have overhauled and made as good as new. I was informed by the former owner, as well as by others, that this car could not be run slower than 8 or 10 miles an hour, which is too fast for a crowded thoroughfare. They claimed that when an attempt was made to run slower than this, the motor would act poorly, the cylinders would miss fire. I claim this is due to faulty adjustment of the carburetor. Am I right? A garage man states it is due to the fact that it is a high-speed motor and cannot be run slowly. To my mind, this does not agree with my knowledge of gasoline motors. Am I right?

3—Another thing I have noticed in regard to the Buick cars, and that is that nearly every time one goes out of commission it is due to a broken crankcase. Is this due to faulty construction and if so, state the remedy, if there is one.—Dr. J. Alex Meldau.

1—It all depends upon the flexibility of the motor. If a motor is designed to operate normally at 1,500 revolutions per minute, the probability is that when throttled down very low, it may miss or stall. Some motors are designed to operate at high speeds and when made to run on small throttle opening, will not propel. In handling a car with a high-speed motor and 3 to 1 ratio, the best method is as follows: With the gears in high, keep the foot continually on the clutch pedal and throw out the clutch sufficiently far so that it will not hold firmly, but instead will grip only at intervals. At the same time this is done the throttle should be opened wide; not all the way, but enough to keep the motor turning over rapidly.

It is better to shift back into second than to perform the operation above described.

2—The Buick Model 10 will not throttle down lower than 8 miles an hour. The motor is of the high-speed type, which proves the garage man's statement to be correct.

3—Records at hand show that Buick crankcases have broken because of connecting-rod burned-bearings, and there is no reason to believe faulty construction to be the cause. Often the owner neglects to fill the crankcase or permits a worn bearing to run too long with the result that the connecting-rod punches a hole through the crankcase.

READER'S COMMENTS ON QUERIES

Upholds Semi-Floating Rear Axle—Number of Cars in California

University, Va., Editor Motor Age—I note an inquiry by F. W. Finlayson in Motor Age, issue April 10, regarding a Garford entered in a Santa Monica road race. I think he has referred to a Studebaker entered in the 1909 event, which in all essentials was practically identical with the Garford 4-40 of later years, having a T-head, $4\frac{3}{4}$ by $5\frac{1}{4}$ inch motor, four speeds direct on third, cone clutch, etc.

Early one morning I was watching the drivers practicing for the race and for one lap an amateur was permitted to drive the Studebaker. He took a turn imprudently and hit a curb while going very rapidly, tearing off the two right wheels, the car settling quietly right side up, on the sidewalk. I think the car was not repaired in time to start in the race. Among those entered were the Stearns 30-60, Locomobile 40, Chadwick six, Apperson 55, Stoddard-Dayton $5\frac{1}{4}$ by $5\frac{1}{4}$ inch, Lozier four and the Thomas 70.

No discussion that I have read regarding an increase in tire sizes on a given car has contemplated the lessened efficiency of the brakes when rear tires are increased in outer diameter. It seems to me that this is a rather important consideration. The ratio existing between drum diameter and wheel diameter, which determines the effectiveness of brakes, given equal widths of bands, is here decreased.

Please indicate the weight in touring form and speed of the following cars; also gear ratio on top speed: Alco six, Fiat six, Knox big six, Knox light six, Peerless 38, 48, 60, Packard 38 and 48, Locomobile R and M, Lozier light six, Lozier big six, Marmon four and six, Pierce 38, 48 and 66, Stevens-Duryea six, Stearns four and six, Garford light six and big six, Oldsmobile six, Premier little six, Chalmers 36, Cadillac, Mercer touring, Pope-Hartford 40.

Probably a majority, and certainly, I think, the best foreign cars use semi-floating rear axles on their shaft models. Here consider the Mercedes, Benz, Peugeot, Itala, Renault, Fiat, Panhard, Mors, Metallurgique, Isotta, Lancia—I cannot now recall others. Comparisons are odious, as all know, and few are qualified to make them. Nevertheless, there probably is more comparing—which salesmen often make appear as contrasting—of motor cars than of any other commodity. In addition to the above cars consider the American makes of Pierce, Simplex, White, Packard, Premier, Franklin, and S. G. V., which use semi-floating rear axles.

In view of the character of the above cars, it would appear that, although less easily demountable, a well designed and properly constructed semi-floating axle is superior to the floating type which calls for heavier hubs and larger tubing for the housing.

The big argument in favor of the floating type is that the shafts may be withdrawn while the car is standing. But why is it necessary to withdraw the drive shafts on occasions other than when the entire car is overhauled unless the material used is uncertain in quality and addicted to breakage? Otherwise it can benefit the owner but little to have this "readily withdrawable" feature. The wheels are far more firmly fixed to the drive shaft and axle as a whole in the case of a semi-floating axle than in that of a full floating axle. Further, I have known of hub caps dropping off from rear axles of cars having the floating type of axle and the drive shaft itself—this depended upon the hub cap to remain in place—dropping out on the road. Also I have seen the dogs on floating drive shafts wear away the hub until there was considerable lost motion, and this before the car had traveled far. This calls for a new hub, or a new shaft, or both, for there can be no bushing or building up at that point.

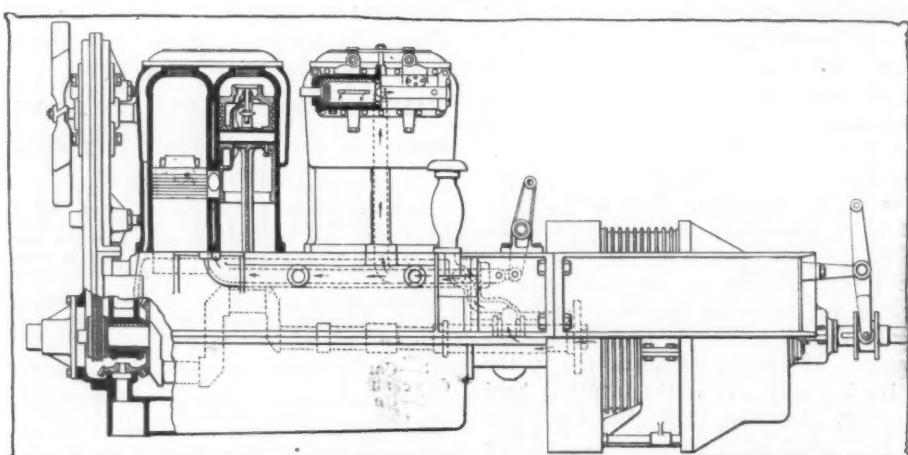


FIG. 3—CONSTRUCTION OF CHURCH PNEUMATIC MOTOR

These instances are not of medium-priced or cheap cars, but of high-grade cars having excellent reputations; not fatal defects, but needless.

Weight below the springs is "dead" and the less of it the better for the tires. The assembly of rear axle and wheels where the axle is of the semi-floating type will weigh considerably less, in actual practice, than where the floating type is used, other points being the same.

A rather minor, as yet, consideration is that front and rear hubs usually are the same size where the semi-floating type of axle is used, which will facilitate the use of wire wheels which are so rapidly coming into vogue.

For the above reasons I have reached the conclusion that floating rear axles owe their predominance in this country to their "demountability" feature and their substantial appearance.

Summing up, the chief advantages of the semi-floating axle are the secure fastening of wheels and drive shafts, the lighter weight, and fewer wearing parts because of the firm affixing of the wheels and shafts.

I also noted that the number of cars registered in California was given in the last edition of Motor Age as 83,728. I lately received a letter from a friend in that state saying that cars bearing over the 100,000 mark on their number plates had appeared in Los Angeles.—Trent G. Anderson.

Answering your questions as to weight, speed and gear ratio, Motor Age herewith gives the information in table form:

Touring car	Weight	Maximum speed	Gear ratio
Alco six.....	4,375	70	3.61—1
Fiat six.....	4,300	60	3.50—1
Knox big six.....	4,450	78	3.00—1
Knox little six.....	4,050	65	3.50—1
Peerless 38.....	4,000	55	3.60—1
Peerless 48.....	4,500	60	3.20—1
Peerless 60.....	5,000	65	2.60—1
Packard 38.....	4,300	62	3.53—1
Packard 48.....	4,500	74	3.20—1
Locomobile R.....	4,200	*..	3.54—1
Locomobile M.....	4,450	*..	3.21—1
Lozier light six.....	3,750	50	3.75—1
Lozier big six.....	4,450	70	2.76—1
Marmon four.....	3,200	55	Optional
Marmon six.....	4,600	60	Optional
Pierce-Arrow 38.....	4,100	*..	Optional
Pierce-Arrow 48.....	4,700	*..	Optional
Pierce-Arrow 66.....	5,400	*..	Optional
Stevens-Duryea six.....	4,100	70	3.70—1
Stearns four.....	4,000	60	3.90—1
Stearns six.....	5,100	70	3.40—1
Garford light six.....	3,400	55	3.25—1
Garford big six.....	4,600	60	Optional
Oldsmobile Limited.....	5,000	72	3.75—1
Premier little six.....	3,750	55	3.50—1
Cadillac.....	3,900	60	3.50—1
Chalmers 36.....	3,250	60	3.75—1
Mercer touring.....	3,600	65	2.86—1
Pope Hartford 29.....	4,600	60	Optional

*Will not state.

The above weights and speeds are approximate and furnished by the Chicago agents of the respective companies.

DETAILS OF EMPIRE TOURING CAR

Reader Given Gear Ratio, Speed and Motor Dimensions

Virden, Ill.—Editor Motor Age—1—What is the gear ratio of the Empire touring car?

2—What is the highest speed ever attained by an Empire car? Who was the driver?

3—What is the bore and stroke and wheelbase of the Empire touring car; also of the roadster?—Ted Campbell

1—The gear ratio of the Empire touring car is 4 to 1.

2—Motzinger in an Empire traveled 5 miles in 3 minutes 55.68 seconds at the Indianapolis speedway in May, 1910.

3—The motor of the Empire touring car is of 3.75-inch bore and 4.50-inch stroke. The wheelbase is 108 inches. At present the Empire is not made in roadster form.

CHURCH PNEUMATIC POWER PLANT

Motor of Odd Construction—Oiling Bushing on Chalmers

Kewanee, Ill.—Editor Motor Age—Would like a detailed description of the motor known as the pneumatic motor, which was exhibited at the Chicago Coliseum show. It has no clutch, gears, etc. Where can I secure literature on this motor?

2—Where should one oil an eccentric bushing on a Chalmers 36?

3—Is there an air-cooled Knight engine on the market?

4—If such an engine were built would it give satisfaction?—Stanley Anderson.

1—The Automatic Motor and Engineering Co., Chicago, makes a power plant to which you refer. It is known as the Church and comprises a four-cylinder two-cycle motor, and a three-cylinder air-compressor which acts as a pneumatic clutch and transmission mechanism. The compressor has three cylinders arranged horizontally, with their head ends secured to the flywheel; and in addition to its duties of power transmission, it furnishes compressed air for fuel injection into the cylinders of the motor.

The construction of the Church pneumatic power plant is illustrated in Figs. 3 and 5. A connecting rod communicates between the piston and a crankpin secured to the back of a bevel pinion gear. This pinion gear is in mesh with a larger bevel gear which is secured to driving shaft; and the driving shaft is designed for direct connection to the propeller shaft of a vehicle.

In operation, as long as a vehicle remains still, the bevel gear on the driving shaft also remains stationary. Thus, if the crankshaft of the motor is revolved as in cranking, the pinion gear in mesh with the stationary bevel gear will have to revolve around the bevel gear, and in so doing will operate the pistons in the horizontal cylinders. Air is admitted to

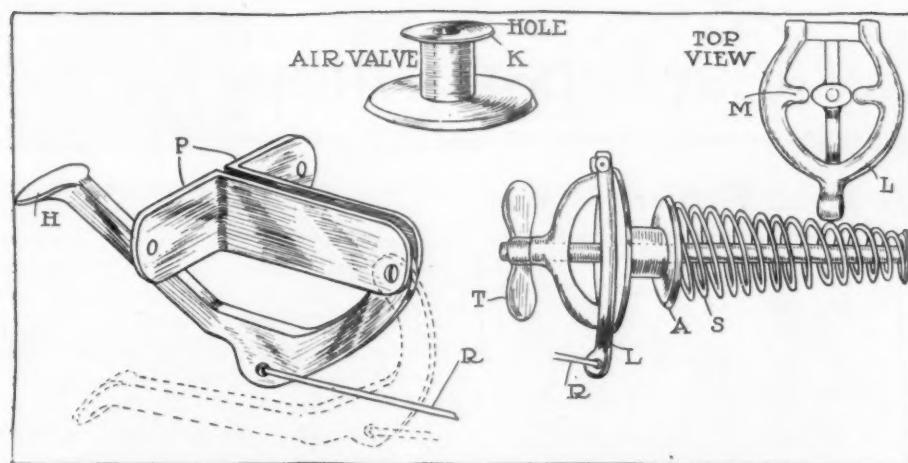


FIG. 4—E-M-F DASH CONTROL OF AUXILIARY AIR

Pulling handle H causes collar L to draw valve A against its seat. There is a screw through spring, S, which goes through the air valve and is fastened at the top by nut T

the cylinders of the air-compressor as indicated by the arrows, and its admission is controlled by an oscillating sleeve valve arranged in the center and in line with the axis of the mechanism.

This valve acts as a throttle, and is controlled by the operator by means of the lever shown at the right of the illustration. This lever moves a rod located inside of the hollow driveshaft; and this rod has a spiral groove at its opposite end in which a little pin is designed to slide. The pin is secured to the socket end of a rod which is secured to the sleeve or throttle valve; thus as the rod is moved endwise, the pin slides in the groove and causes the throttle valve to revolve. Ports in the sleeve valve are in this manner caused to move into and out of register with ports in the passages through which the air is drawn into the cylinders.

The air that is compressed in the cylinders is forced through automatic poppet valves V in the heads, and then through the hollow end of the motor crankshaft to the cylinders of the motor, as indicated in Fig. 5.

2—There is but one eccentric bushing on the Chalmers 36 and it is in the steering post. The mechanism is of the worm-and-gear type and the shaft of the gear fits into the eccentric bushing. It is lubricated by the grease within the case of the steering and there is but one way of lubricating it from the outside. This is by the grease cups on the steering mechanism case.

3 and 4—These questions were answered on page 31 in the issue of April 17.

ADJUSTING STUDEBAKER STEERING Dash Carburetor Adjustment on E-M-F 30 Described and Illustrated

St. Louis, Mo.—Editor Motor Age—Tell me how to make an adjustment in the steering worm of a 1912 Studebaker E-M-F 30.

2—Is it possible to rig up a carburetor dash adjustment for an E-M-F carburetor?—G. W. Swarting.

1—To adjust the worm of the steering post of an E-M-F 30, proceed as follows: Jack up the front wheels, the reason being that when not free there is no way of telling how much play there is in the

steering. There is a large hexagonal nut designated as adjusting nut in Fig. 1. This should be screwed downward, one-quarter turn at a time. After turning it slightly notice if the wheels turn with each turn of the steering wheel. Have someone hold the front wheels while the steering wheel is being turned as it is usually. The steering wheel should be able to move but slightly while the wheels are being held steady. If this is not the case give the adjusting nut another short turn until there is just a little play in the steering gears.

2—It is possible to make a dash air adjustment for an E-M-F 30, but it would cost more to make it than it does to buy one of the Studebaker Corp., which makes the car. There is in use now on the 30s a simple and effective air adjustment. This is shown in Fig. 4. It consists of a means of pulling the air valve shut and pushing it open when desired. The collar L has attached to it two tongues M as shown by the top view in the same figure. These tongues fit under the corners K of the air valve proper. The clamp swings on a pivot. There is attached to the clamp at

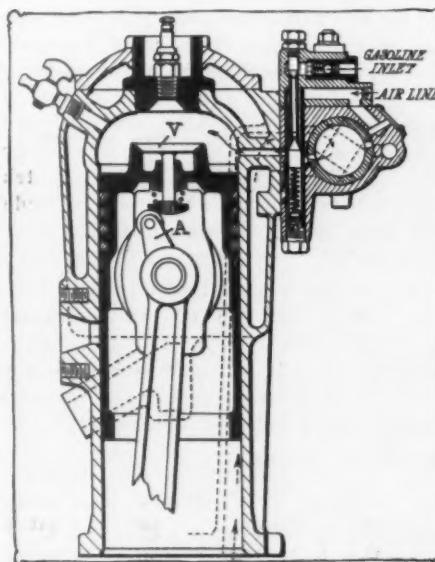


FIG. 5—CROSS-SECTION OF CYLINDER OF CHURCH MOTOR

its end a rod R which leads to the handle, H on the dash. This handle is set between two clamps, P very tightly so that when the handle is set in a certain position it will remain there. The clamps are fastened to the dash. If the handle is pulled upward it draws the rod which pulls the clamp. But the clamp carries with it, by means of the tongues, the air valve. An upward movement, then, of the handle closes the air valve, which position is used in starting. Pushing the handle downward opens the air valve against the tension of spring, S.

MOTOR KICKS ON RETARDED SPARK

Engine Back-Kicks Because Breaker Points Are Too Far Apart

Nelsonville, O.—Editor Motor Age—What would cause an engine to kick on a 1912 model Cole, equipped with a Bosch high-tension magneto, when cranking on the battery with the spark fully retarded?—A Subscriber.

The motor back-kicks probably because the breaker points of the battery system are too far apart. These points should be adjusted, so that they will be closer and the trouble will cease, no doubt.

RECTIFIER FOR FORD MAGNETO

Kerosene Dissolves Carbon Only Slightly—Should Be Put In at Night

Baltimore, Md.—In the March 9 issue of Motor Age, in answer to Reader, it is stated that there is no rectifier on the market that can be used with a Ford magneto to charge a storage battery. On page 121 of that issue is the ad of the American Battery Co., 1124 Fulton street, Chicago. Which is right?

2—Why is kerosene recommended to clean carbon in gasoline motors, for when it is used as fuel it carbonizes more than gasoline?—F. T. Hill.

1—The American Battery Co. does make a rectifier for Ford cars and this in connection with the battery is to be used as a reserve for the lights. The Ford magneto does not generate sufficient current to properly charge a storage battery, and if after running all day all five lights were turned on the battery soon would become exhausted, for the magneto through the day could not generate sufficient current to charge the battery and supply ignition current.

2—Kerosene is used to loosen carbon, which is expected to blow out with the exhaust. There are very few carbon solvents that will not injure the metal of the cylinders. Kerosene will dissolve carbon only slightly. When introduced into the cylinders it is not expected that the carbon be dissolved, but rather that the carbon be loosened. When placed into a cylinder at night, the work of carbon loosening is done, but the kerosene evaporates. Running the motor on kerosene for any length of time will cause it to carbonize. Kerosene should be used with care.

Peugeot Represented Here

In the Reader's Clearing House in the issue of April 24 it was stated that the Peugeot and Clement cars were not represented in this country. This is in error. Both cars are handled by the Paul LaCroix Automobile Co., 1770 Broadway, New York.



The Motor Car Repair Shop

ALTHOUGH it is customary in the ordinary repairshop to secure a magneto in the vise when adjustments or repairs are to be made upon it, one very large and well equipped shop has found it advisable to provide special stands such as is shown in Fig. 1 for this purpose, the advantages claimed for it being: greater accessibility to the various parts of the magneto, the vise is unoccupied so that it may be used for other operations, and there is no danger of injuring the mechanism by clamping it too tightly or by having the vise jaws accidentally loosen up and permitting the instrument to drop onto the floor.

The device is very cheap and very simple, and can be made by any mechanic during spare time and perhaps out of material obtainable from the scrap-heap of the shop. It consists simply of a raised sheet iron platform, or base plate, securely mounted upon two suitably bent pieces of band iron which in turn are secured to the workbench. The sheet iron base plate is about $\frac{1}{4}$ -inch thick and contains four slots or holes for attachment of magnetos so secured to their motors; whilst provisions also are made for the quick attachment of metal straps for holding magnetos which are strapped to their baseplates on the motor.

The band-iron brackets are about $\frac{1}{4}$ -inch thick and 1-inch wide and of such a height as to bring the magneto into a convenient position for the workmen. These brackets may be secured to the work bench by means of conveniently removable bolts or studs, so as not to be in the way when not in use. Any equipment of this nature that adds to the convenience of the workman, facilitates his operations and increases the general efficiency of the shop.

Starting a Cold Motor

It hardly is worth while exhausting one's energies trying to start a cold motor

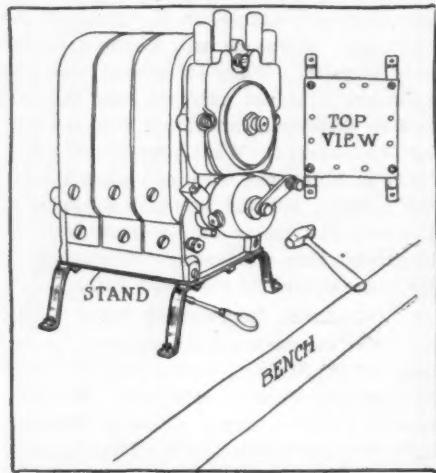


FIG. 1—HANDY MAGNETO STAND

A Road Radiator Repair

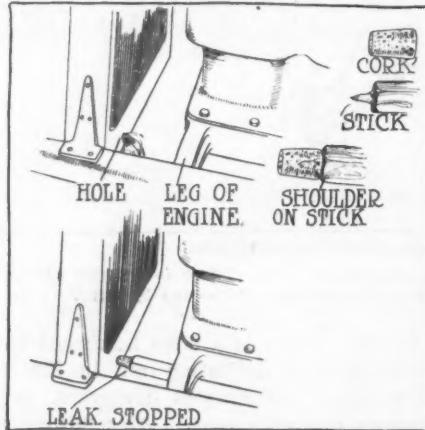


FIG. 2—NOVEL ROAD RADIATOR REPAIR

nowadays without first priming or injecting about half a thimbleful of gasoline into the cylinders. In the absence of an oil can full of gasoline for this purpose, a tire-valve cap furnishes a very good receptacle, as it generally holds just about enough for four priming cups. It, therefore, usually can be dipped into the gasoline tank by hand or on the end of a string, unless one of the carburetor or gasoline-line petcocks is more convenient. The starting of a cold motor may be greatly facilitated by filling the cooling system with warm water and also by holding a cloth saturated with gasoline over the air-inlet of the carburetor.

Stopped Radiator Leak

One Sunday after a run from Paris to Versailles a motor car was left in a garage for a few hours while the occupants visited the parks and palaces. On returning to the garage a large pool of water was noticed under the car. Investigation showed that the radiator was quite empty, and on refilling it, water was seen to issue forth in a fine stream from a hole near the inner, lower left side. An effort was made to stop up the hole by forcing in a piece of cloth with a match whittled to a point. This simply made the hole larger, however, and the water then gushed forth in three or four streams.

The writer was holding his finger over the hole whilst one of the passengers whittled a match for another attempt to plug it, when it occurred to him that a cork impaled on a stick of wood and then jammed between the radiator and the engine leg, might serve the same purpose as holding the finger over the hole. So a suitable stick of wood was found and one end cut to a taper and point as indicated in the illustration, Fig. 2; then the pointed end was stuck into the cork as shown, and the device thus formed

jammed between the engine leg and the radiator, so that the one end surface of the cork covered the hole. This stopped the leak most effectively, and the return to Paris was made without trouble or any appreciable loss of water.

It will be noticed that a shoulder was left at the base of the spear or tapered end of the stick; this was made to prevent the point of the stick from piercing the cork to a greater depth. Thus the resiliency of the cork was maintained and employed to hold the device in place; which it did in spite of the vibration of the motor and car on the return trip.

Simple Telescoping Lamp Bracket

In the lower section of Fig. 1, is shown a very useful lamp bracket for adjustably hanging an electric lamp over the work-bench. This bracket is made from two or three lengths of tubing varying in diameter so that one length may slide freely into the bore of the other as in a telescope. The length which supports the lamp is the smallest in diameter. Its bore is just large enough to receive the lamp cord conveniently and its end either flared out or bent downward so as to give a smoothly curved edge over which the cord may hang without chafing the insulation.

The largest end or length of tubing is at the opposite end to that which supports the lamp and it also is bent at an angle near one end so that it may fit into the supporting eyes or brackets. As indicated in the illustration, these brackets are simply a couple of screw-eyes, such as are obtainable in any hardware store, and they are so arranged as to form a suitable hinge support for the telescoping tubes to work in when the lamp is to be swung.

When a suitable place can be found on the wall at the back of the workbench, for the attachment of the screw-eyes, the end of the bracket which rests therein may be bent at right angles, and still extend at a suitable height over the work-bench.

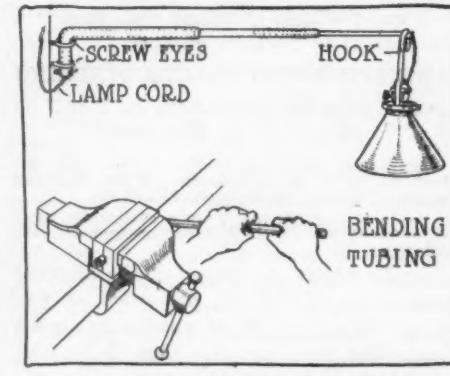


FIG. 3—TELESCOPING LAMP BRACKET

Housing the Motor Car

The Apartment
House
Garage



GARAGE OF CIVIL SERVICE COMMISSIONER LOWER

IT is not very often that the owner of a motor car takes it upon himself to build a garage for his car, but nevertheless this happens to be the case with Civil Service Commissioner Lower, Chicago. Although Mr. Lower himself did little of the work, his son built every part of the garage but the brick walls.

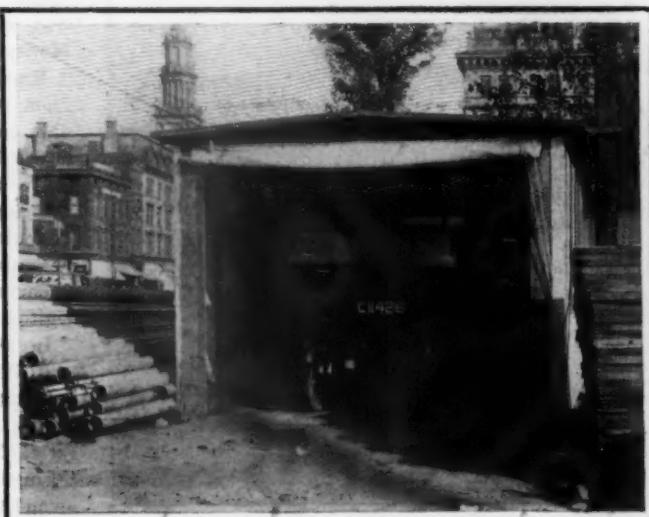
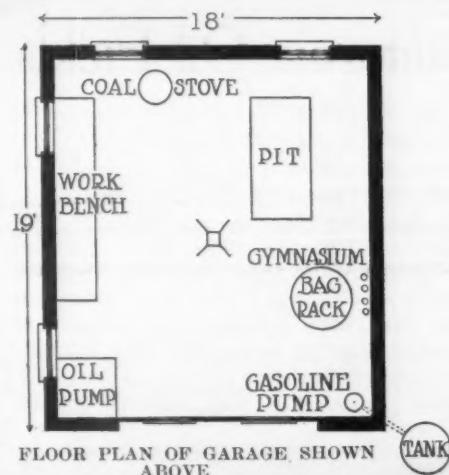
The building, without equipment, cost the owner approximately \$700 which does not include labor.

Gymnasium in Garage.

Inasmuch as the building originally was designed to house a motor car, it was thought advisable to utilize all space, with the result that part of the building is used as a gymnasium. The illustration of the floor plans shows only a place for getting morning exercise, but above this is a storage rack for a canoe. This is fastened to the ceiling of the building by wooden braces.

The outside of the building is of brick, while the facing of the walls on the inside is of wood. The floor is of cement and contains a pit of ample size for the car housed. The drain is almost in the middle of the graded floor.

The upper portion of the garage is of wood construction and contains a place for the storage parts. Anti-freeze mixtures, worn parts, rags and such things are stored in this space. An exceedingly clever arrangement is in the



CANVAS-WALLED GARAGE BUILT BY HARTFORD CONTRACTOR

placing of the coal stove opposite the gasoline pump, thus avoiding possibility of fire.

There is but one entrance to the garage and that faces the rear of the owner's home. This entrance is about 10 feet wide and high enough to permit of the entrance of a car with the top up. A cement path leads to the entrance.

A feature of the garage is the lighting arrangement. There are two windows on each side of the building and, as will be noticed from the floor plan, two of these windows are contained in the entrance doors. The latter are of the sliding type. That is, the door is in two parts, each part sliding into a pocket in the wall. Besides there are a number of wall and drop lights which are used when repairs at night are necessary.

Arrangement of Tools

Another feature of the garage of Mr. Lower is the arrangement of the tools. Although there is a work bench with ample room for holding all tools, the walls have been converted into a tool rack. Each tool has its place. The hanging arrangements vary with the type of tool. Some are suspended by nails, others require brackets. Every type of tool needed is hung on the wall, so that in doing repair work there is not the scattering of instruments about the bench, as is the custom usually. When work is completed each tool is placed on the wall and if a place on the wall is empty it means that a tool is missing.

A 60-gallon gasoline tank is underground about 20 feet from the building, a lead from it being attached to a pump near the entrance of the building. The oil is stored in a portable tank, such as may be seen in any big garage so that oil may be carried to the car if the latter is in the alley or on the street.

Just how a contractor engaged in the construction of the new municipal building at Hartford, Conn., garaged his car is shown in one of the accompanying illustrations. By leaving his car on the street unattended it was in the way of traffic and at the same time was easy prey for motor bandits who were operating at that time. The frame work of this affair is wood, the walls are canvas, the roof light wood covered with building paper. The entrance flap is raised by ropes and rolls up like a theater curtain. The enclosure cost little and answered the purpose nicely obviating the necessity of leaving the car in the street.



The Realm of The Commercial Car



WHITES HAULING SHEET METAL AND SUPPLIES
THROUGH SAND HILLS

Motor Trucks Discount Mules in California Oil Fields

WITH every new achievement of the motor truck, and its accomplishment of things impossible to horses the public advances a step farther in its belief in motor trucks in general. Only when the public, through continual reading of performances of these vehicles, becomes thoroughly convinced of the practical money-saving possibilities of motor trucks will the business and industry take the place it deserves. Whether these feats are performed by one make of truck or

another makes but little difference to the industry at large so long as they are done and the public is convinced as to the revolutionary value of motor hauling.

The following is a description of long-haul service performed by a fleet of eighteen White trucks operating from the Midway oil fields, California, to tidewater, at San Pedro, crossing some 40 miles of desert climbing to an 8,500 foot altitude, and displacing some 500 of the best Missouri mules. The work included approx-

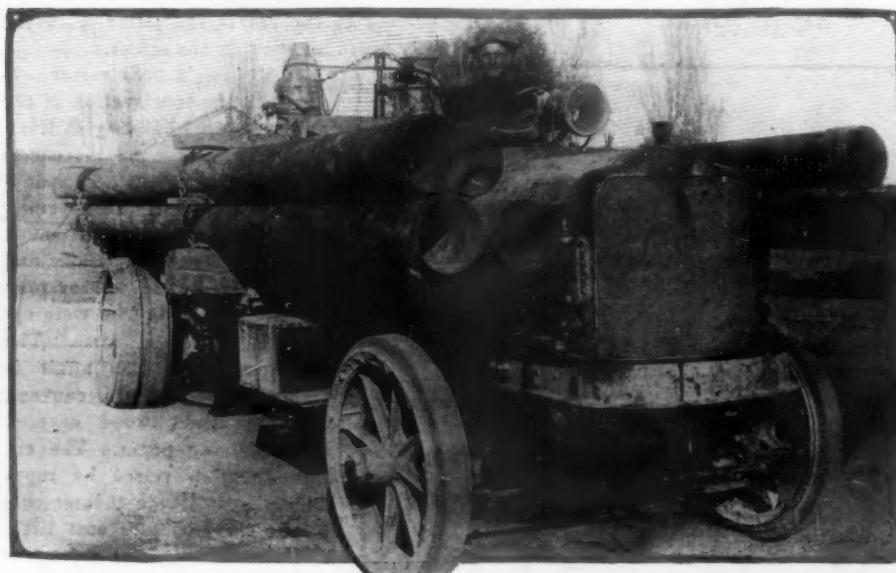
imately 700,000 ton-miles of endeavor on the single contract to haul 35,000 tons of material for the construction of an enormous oil pipe line. Nine miles of each trip was over river bottom.

Other difficulties of a serious nature either were obviated or circumvented by mechanical reliability, rare ingenuity, efficiency and good management. Before great progress had been made it became necessary to build bridges, put on full-blooded Indian drivers to stand the heat, build desert roads of sage-brush and eucalyptus branches—and withal the contract was more profitable than normal work.

Money Made on Contract

Knowledge how to get the best results from motor trucks, coupled with remarkable resourcefulness and a little romance, enabled the Auto Delivery Co. to perform its contract profitably, and demonstrate the adaptability of trucks for unusually difficult work on a contract job that was perhaps the most remarkable one ever undertaken with motor vehicles in the United States of America.

In addition to the pipe-line, the General Pipe Line Co. built frequent pumping stations between the oil fields and San Pedro, requiring the trucks to haul material for these buildings also. Prior to taking the contract the Auto Delivery Co. owned ten motor trucks and purchased two others on which it could get immediate



HOW PIPES WERE LASHED TO SIDE OF TRUCK FOR QUICK UNLOADING

delivery. Going still farther it made contracts with individual owners until it had eighteen in operation. The difficulties and achievements are best described by one who visited Lancaster, Cal., for the purpose of studying the operating conditions.

Five tons of oil were loaded on a truck to run to a borax mine in answer to an emergency call, 80 miles distant in the mountains. The roads were soft and the grades in places were 32 per cent. On the steepest grades it was necessary to use air pressure on the gasoline tank to make the fuel flow to the carburetor, this being the only difficulty experienced on the entire trip. On the return from the borax mine, 5 tons of borax were brought back to the railroad.

The day this trip was made the thermometer registered 122 degrees in the shade—and there was no shade in Lancaster. The route to the borax mine was across the desert for 40 miles without a tree or a single green thing in sight. The truck carried a supply of water and food. The sand in places was so deep that the front axle dragged on the ground, and the wind blew about 30 miles an hour most of the day, from the rear, so that the crew rode in a hot blast and a cloud of dust so thick that they could hardly see 20 feet in front of them at any time.

Gear Ratios Lowered

Fifty miles of this trip was over the same road used by the Auto Delivery Co. in its hauling contract. The roads were so soft and the operating conditions so difficult that lower gears were installed in all the trucks. The gear ratio between the engine and the rear wheels was about 50 per cent lower than used for normal work.

Of course the time was not fast. The average for 40 miles was only about 8 miles an hour but when it is considered that the great heat and the soft roads made it impossible for the best Missouri mules to haul more than 1,000 pounds to the animal, and when it is considered that these animals, hauling 1,000 pounds, travel only about 1½ miles in 1 hour, and 16 miles being a big day's work for ten mules hauling

5 tons it will be seen that a motor truck hauling 5 tons and traveling 80 miles a day would do the work of five ten-mule teams. In other words, one motor truck would do as much work every day as fifty mules.

Alfalfa hay for feeding mules is no small item. In places remote from the railroad, it sells at \$35 a ton, making the cost of feeding a mule not less than \$1 a day. Feeding, however, was not the only problem. On account of the great heat, the death rate among mules is terrible, and it will be readily understood why trucks were given the hauling contract.

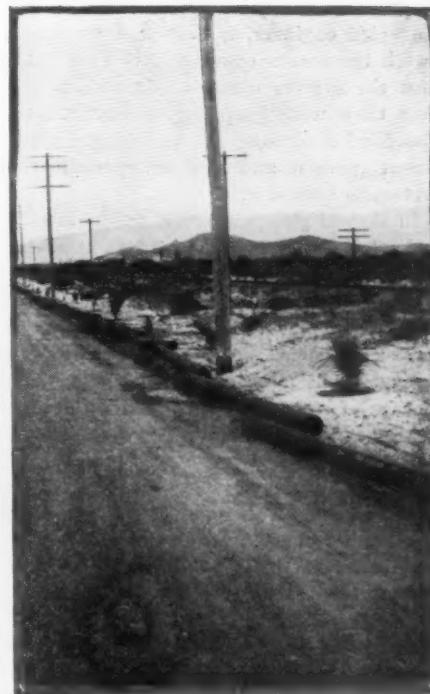
Performance of Trucks

Included in the trucks used by the Auto Delivery Co. were five which had run more than 100,000 miles each before being placed on this job. They made a trip every day beside the newer trucks, the only difference between the old and new being a somewhat lower gear ratio in the new ones. The old ones were required to carry a load of 4½ tons while the new ones carried 5 tons.

One of the older trucks was driven by an Indian who lived on the desert. He learned to drive the truck shortly after work on the contract had commenced, and he drove sixty round trips of 80 to 110 miles each without a single mishap or loss of a minute from the schedule which had been mapped out for his truck. He was paid 50 cents per hour and he drove 16 hours a day every day for 60 days. No other driver was able to stand the heat or fatigue as well as this native Indian.

Extra gasoline, oil and water were carried in 10-gallon milk cans. Blankets and enough food and water to last 2 days formed a part of each load. This equipment was often necessary. Although the temperature ran as high as 122 degrees in the shade in daytime, it was very cold at night on account of the high altitudes which were reached in the mountains on nearly every trip.

Of the ten trucks hauling material out of Lancaster the Auto Delivery Co. planned to have two laid up all the time for adjustments, repairs, lubrication, overhauling



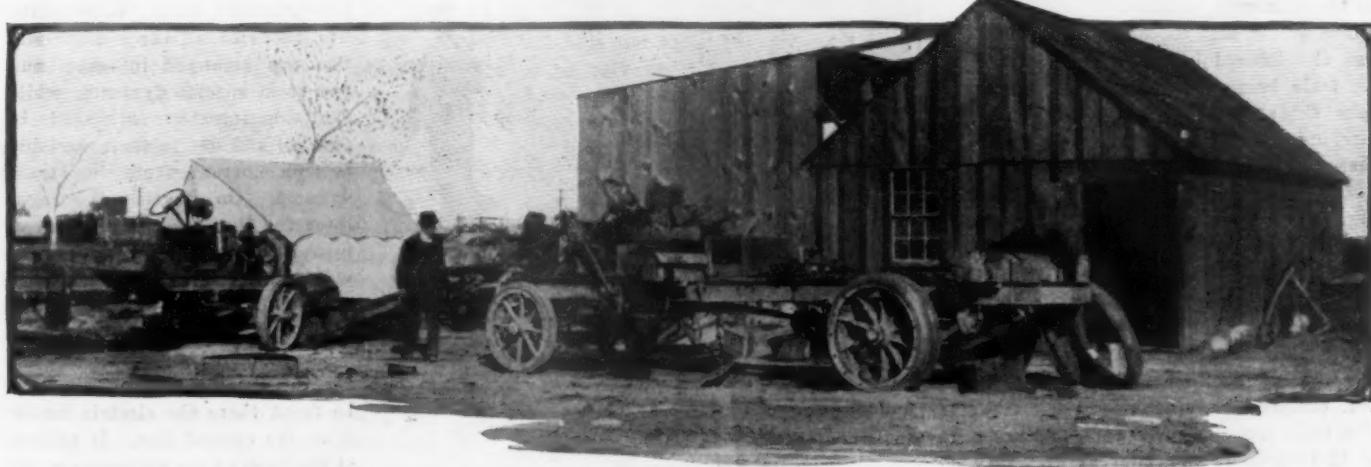
HOW PIPES WERE DISTRIBUTED ALONG ROAD

ing, etc. Eighty per cent of the equipment was on the road all the time and 20 per cent was in the temporary garage which was built at Lancaster.

These ten trucks did as much work as 400 mules in continuous service would do, or as much on an average as 500 would do, because to keep 400 in service it requires a stock of 500 mules. Some are laid up for one reason or another all the time.

Skeptical at First

There had been several previous attempts to haul through this country with motor trucks, and owing to their failure many persons tried to dissuade Mr. Beam, manager of the Auto Delivery Co., from undertaking the contract. He insisted that he was satisfied he could do the work in a creditable manner. The trucks that were tried there previously included eight of the best known American trucks and one well known foreign truck. Mr. Beam put in a large stock of parts at Lancaster to



CRUDE BUT EFFICIENT GARAGE AT LANCASTER THAT HOUSED THE TRUCKS

be prepared for quick repairs, and he had his chief engineer, a first-class mechanic, watch the trucks constantly to make sure that the drivers did not abuse them and that they were properly lubricated. He also fixed a running schedule between different points and did not permit the drivers to exceed it.

In several places where it was necessary to haul material into the mountains where there were no roads, sage brush was gathered from the desert and eucalyptus branches were cut in great quantities and spread crosswise of the trail along an arroya. This mixture, and a certain percentage of straw, was sprinkled with sand, making a very good motor truck road, over which no difficulty was experienced.

Ingenuity Displayed

The amount of ingenuity and planning was extraordinary. In one spot where a road had been built along the side of a stream, the bank caved in and the road went with it, also a truck which landed upside down in the bed of the stream. About 2 miles below this point the road crosses the bed of the stream, and after getting a large number of laborers to turn the truck over and replace its load of lumber, the truck was started down the bed of the stream.

This experience demonstrated that the river-bed made a better road than the one

which had been used, and the road was therefore abandoned. By cutting the bank away so that the trucks could get down to the bed of the river, they were enabled to travel 9 miles down the stream. The bottom was semi-quicksand, with water running over it, and it was kept comparatively hard. The truck drivers soon discovered, however, that if they stopped their trucks anywhere in those 9 miles, the truck promptly settled in the sand. On one occasion a truck went down to the axles before the driver could build a levee around the wheels to prevent the water from undermining the wheels. As long as they were kept moving the bed of the river made a very good roadbed.

It was not an uncommon thing for these trucks to lose traction on the desert roads. The wheels would spin in the sand and dig right down until the axles rested on the ground. For such emergencies the trucks carried two 5-inch pipes about 15 feet long, with the ends flattened out and bent over. Whenever traction could not be had, the flat end of one of these pipes was placed under the rear wheels and between the dual tires. It was first necessary for the driver to dig a hole sufficient to insert the pipe, whereupon, by starting the truck, it would run right up on these pipes.

Another scheme that was used to im-

prove traction was the dragging of a railroad rail about 10 feet long, every other day on the desert road. The rail was hooked on the rear of the truck in such a way that it filled up ruts and kept the desert road in fairly good condition.

These instances show the ingenuity necessary to overcome the difficulties of this contract, and while the trucks must be given due credit for wonderful work under these conditions, an equal amount of credit is due the able management which resulted in such a large volume of work.

Cost of Operation

The cost of operating the trucks was of course greater than under normal conditions. It was 50 per cent more per mile, but as the roads were generally soft, the tire wear and tear was much less than on average roads. One of the facts brought out in this work is that tires which ordinarily wear out in 8,000 or 10,000 miles on city streets would last three times that mileage on these soft desert roads. There seemed to be practically no wear and tear that could be noticed, but inasmuch as the earnings of the truck under these conditions were more than double what they would be under normal conditions, the additional operating expenses being only 50 per cent greater, the profit was greater than to be found in normal work and the ton-mile cost less when hauled by trucks.

A German Road Train that Utilizes Electric Transmission

WHILE the economical importance of road trains is realized more and more, few types built to date have realized the expectations of the builders. There is, as a rule, too great a weight of machinery for the roads and bridges to withstand, and on reducing the weight to the maximum allowed, which in Germany is 6 tons, the use of several trailers must be discontinued and the outfit resolves itself into a tractor and trailer only.

In order to get satisfactory service all trailers should follow in the tracks of the front car. There should be a distribution of traction effort as well, so that the driving wheels do not harm the road in bad spots, while the weight on the road should be the minimum possible.

One of the first successful tractor trains was the Renard of 1904, every wheel in the train being a driving wheel, a continuous shaft with flexible joint couplings carrying the power of the motor up front back through the whole train.

Another solution suggested by a German engineer, W. A. Th. Müller, of Berlin-Steglitz, utilizes electric transmission for the motive force. It is well known that electric motors are not exacting in service, while their gearings can be rendered most substantial. A road train designed on this system by Strassenzug Gesellschaft Ltd. comprises a tractor and six trailers of a total capacity of 30 tons and a speed of 12 kilometers per hour as an average and 16 kilometers as a maximum. A strik-

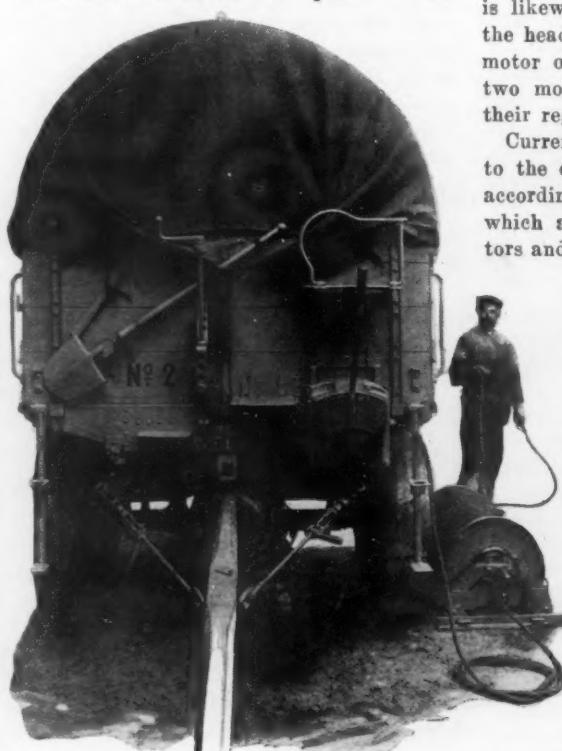
ing feature is the uniform design of all the bogies. The train exclusively comprises driving wheels with steel rims 200 millimeters in width and 1,000 millimeters in external diameter. All parts of the

gearings are interchangeable, which allows the number of spare parts to be reduced to a minimum.

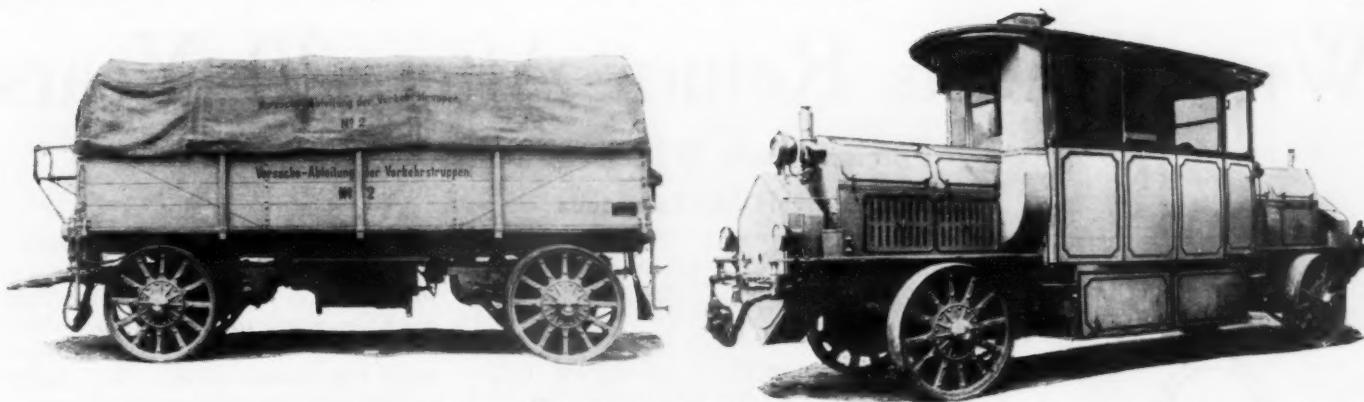
The perfectly symmetric arrangement of the vehicles allows the train to travel indifferently in either direction. The tractor is likewise symmetrical and comprises at the head and rear, respectively, a gasoline motor of 75-90 horsepower. Between the two motors there are the dynamos with their regulators and the driver's cabin.

Current is distributed from the dynamos to the electric motors driving the wheels according to a new system of connections, which avoids the arrangement of regulators and switches on the trailer and allows the tractive effort and speed to be controlled within wide limits. The fields of all the electric motors are arranged in series and fed from special dynamos, while the armatures are arranged in parallel and derive their variable tension current from the main dynamo. On starting the regulator for the tractive effort is at first adjusted, after which the voltage of the main dynamo is altered by means of the speed regulator.

The standard bogey is used both for the tractor and the trailers. In front there the electric motor is in the central line. It carries at the back on the extension of its shaft the disk of the electro-mag-



MANOEUVRING CABLE AND SWITCH



TRAILER AND TRACTOR OF GERMAN ELECTRIC TRAIN

Major-General Wood Praises U. S. Army Motor Trucks

netic brake. The gear case which comes next is connected at both ends by means of driving chains with the wheels of the vehicle. The two bogeys of each trailer are connected together by a worm and shaft, so that any turn of one bogey entails a corresponding turn of the other in an opposite direction. One of the figures shows the connection between each two trailers. A coupling rod leads from one chassis to the other; below there is a dismountable triangular pole, which facilitates uncoupling or reversing the direction of traveling.

Since all wheels are driving wheels, the strains and stresses between the vehicles are reduced to a minimum. The lateral components susceptible of interfering with the steering of the train are altogether negligible and the independent arrangement of the steering and coupling devices facilitates steering maneuvers. The sharpest curves dealt with by the train are 5.0 meters in radius, from the center of the car.

In traveling backwards, the steering triangles are uncoupled. The last car is fitted with a long pole connected with the bogeys by tension cables, which, in traveling backwards, is carried by the men. In principle the tractor may be located any place in the road train, being frequently placed in the center during train-forming maneuvers, but in normal service it is placed at the head of the train like the locomotive of a railway train.

Individual trailers can be operated by means of a long cable fitted with a switch resembling the starting and reversing switches of series motors; the motor fields then are connected up in series to the armatures arranged in parallel. These maneuvering cables allow the trailers to be handled from a distance of up to 300 meters without displacing the tractor.

The uniform distribution of weights over all the train axles allows even relatively weak bridges to be readily traversed. The train has been used with satisfactory results in transporting bricks and other building material, rails, locomotives and heavy cranes. The useful capacity is about 5,000 kilograms per vehicle, but loads of 6,000 kilograms are readily transported.

MOTOR trucks are destined to furnish the solution to the problem of transportation that is at present proving of no little worry to officers of the United States army in charge of the quartermaster's department in which the problem of transportation is handled. This is the opinion expressed by Major General Leonard A. Wood, chief of staff of the United States army, on his recent visit to the mobilization camp of the second division at Galveston and Texas City where 12,000 soldiers are now encamped. The same opinion has been expressed by other officers of high rank in the second division, especially since the arrival in Galveston for use by the second division of six large motor trucks. These trucks have been put in service between the depot quartermaster's storehouse at Galveston and the camps of the soldiers at Fort Crockett and Texas City.

In speaking of the problem of transportation in the United States army, Major-General Leonard Wood said that this was one of the questions which must be worked out during the present mobilization.

"The present transportation of the United States army, as regards supply and combat trains, are entirely inadequate," he said. "The service regulations providing for this transportation have not been well worked out. This is the great problem that must be solved in the mobilization camp of the second division, and in its solution the motor truck must occupy an important place. It is to the large motor truck that the army of the United States must look for transportation for supply and combat trains.

Six Trucks in Service

The use of the six motor trucks now in service with the second division has been so satisfactory that other trucks are likely to be secured. These six trucks have been making from one to several trips each day between Texas City and Galveston, a distance of about 16 miles by shelled road. It is the boast of officers of the quartermasters corps that not an organization of the second division has failed to have fresh bread and fresh meat for every meal since the motor trucks

were put in service. The trucks are employed for the greater portion of the time in transporting fresh meats, bread and other perishable foods from Galveston depots to the Texas City camp. These perishable foods must be kept in Galveston on cold storage and are sent to the army camps daily only as they are needed.

In speaking of the use of motor trucks in the army, Major-General Wood, Brigadier-General Frederick A. Smith, and other officers of high rank have expressed strong opinions that the motor trucks are destined to form the basis of the transportation for supplies of an army in the field. The motor trucks will be used chiefly between the base of supplies and the army, where good roads are assured. However, with the growing sentiment in favor of good roads, General Wood has expressed the opinion that the time is not far distant when motor trucks can be used in almost any part of the country.

Has Advantage Over Mules

Motor trucks in the army have a great advantage over the old-time army mule. One motor truck will take the place of three wagons each with a four-mule team, so far as the tonnage hauled at one load is concerned. The motor truck can make a trip in about one-fifth the time required for the mule teams.

Another advantage of the motor truck over the army mule and wagon is a great economizing in road space occupied by a train. The cars can be driven near together making a very short train and enabling them to be effectively guarded by a small number of soldiers. This is no small consideration in time of war when every available man is needed to make an additional rifle on the firing line. Again the forage that must be provided for the mules of a wagon train requires a wagon train in itself for its transportation, thus greatly increasing the required number of wagons and mules for an organization. In the case of motor trucks only a few barrels of gasoline are needed and these can be easily hauled in a very little space. Herein is another point in economy that is not being overlooked by army officers.

Wire Wheels Return After 20 Years

Foreign-Made Wheels—Part III

By H. A. Tarantous

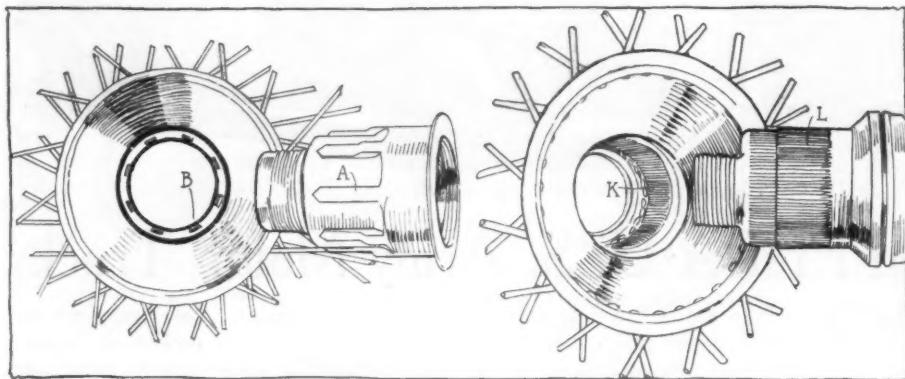


FIG. 1—TWO DRIVING METHODS ON GOODYEAR WHEELS
At the left the key drive, at the right the serrated drive

IN Europe the wire wheel has flourished more than it has in this country. In England the majority of the passenger cars are wire equipped and even in France there are a large number, although the latter country has been slow to adopt the device, believing until recently the wooden wheel more efficient than the wire.

With the perfection of the wheel abroad and its ultimate approval by most of the car manufacturers its fame has spread to this land and the types manufactured in this country differ only slightly from those made abroad, America in a sense taking dictation from the foreign makers.

A broad exhaustive tests have been made, principally by the Rudge-Whitworth Co., the results of which were sent broadcast. It has been shown by this company's laboratory work that the wire wheel is able to withstand the enormous strains to which it is subjected on the motor car. It is natural that England should be first to adopt wire wheels because of the fact that

the Rudge-Whitworth Co. is an English concern. France, on the other hand, did not rely upon the English laboratory test alone, but to prove the wire wheel efficient fitted a number of cars with them and sent them on the road.

Perhaps the feature to the Frenchmen was the tire-saving ability of the wire wheel, but only after it showed that it could withstand the great weight of the motor car and do as well in service as the wooden, did the French car manufacturers adopt the wire wheel as stock equipment.

Although England is leading in the number of wire wheels in use on stock cars, the other European countries are following and within a very short time it is expected that 90 per cent of the European cars will leave the factory wire-equipped. This percentage is in no way a certainty, but according to the present rate of advance, together with the statements of the manufacturers of such types of wheels, the time is not far off when the wooden wheel will

be discarded entirely on the other side.

One of the largest manufacturers of wire wheels in Europe is the Rudge-Whitworth Co., whose wire wheels are made in double-spoked and triple-spoked forms. The triple-spoked wheel is slightly stronger than the double-spoked wheel.

Rudge Whitworth Types

For the season of 1913, Rudge-Whitworth has brought out a new detachable wheel which differs from previous constructions in that a new locking arrangement is provided which greatly simplifies the attachment and removal of the wheel. The new locknut, by virtue of its contact with the inner hub and with shell of the detachable wheel has no tendency to come undone when once tightened, and will, in fact, tighten itself when the car is in operation. Fig. 2 shows a section of a wheel in place on its inner hub; A is the inner hub, B is the detachable shell, and C is the lock nut.

An examination of the illustration will show that the detachable shell B engages with the inner hub A by means of long serrations, giving a great driving area. At the inner end the hub shell is supported on the inner hub by a cone seating of 60 degrees angle, the area of which is 25 per cent greater than that of the earlier pattern. At the outer end is the lock nut C, which engages by means of its thread with the outside of the inner hub, and by means of an internal cone seating with the outside of the shell B. It will be noticed that there is nothing else that touches the lock nut.

The lock nut is exterior both to the inner hub and the shell of the detachable wheel, and consequently it will tend to lag behind them both when the wheel is

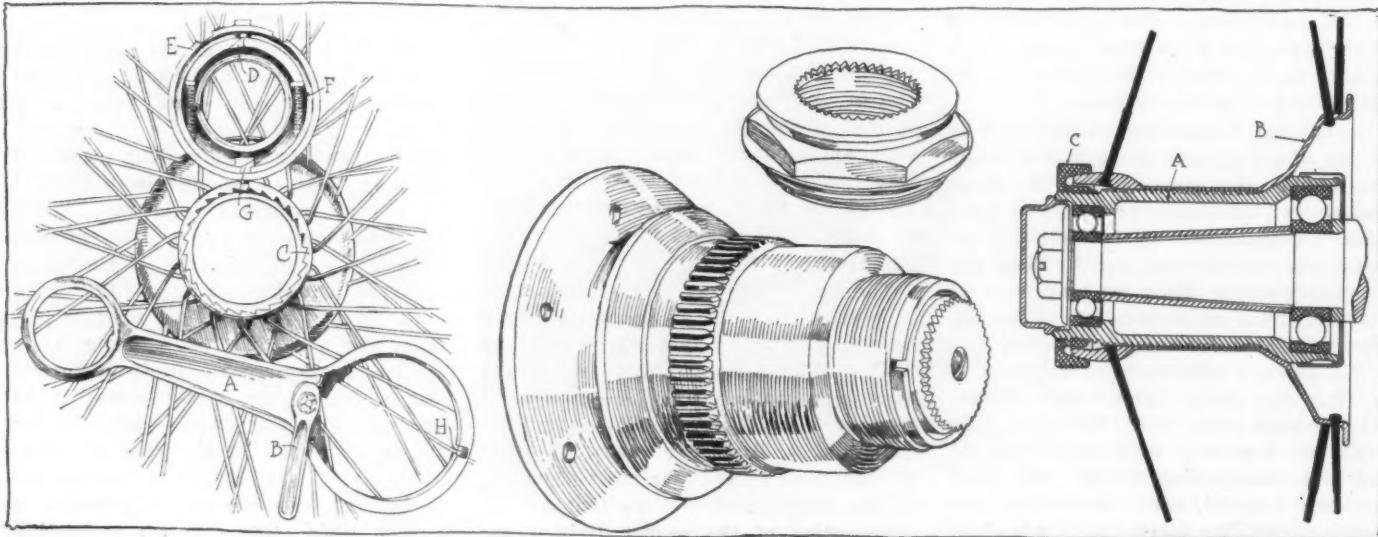


FIG. 2—DETAILS OF THREE FOREIGN WIRE WHEELS
At the left Goodyear locking device; in the center, demountable inner hub of Dunlop; section of Rudge Whitworth at the extreme right

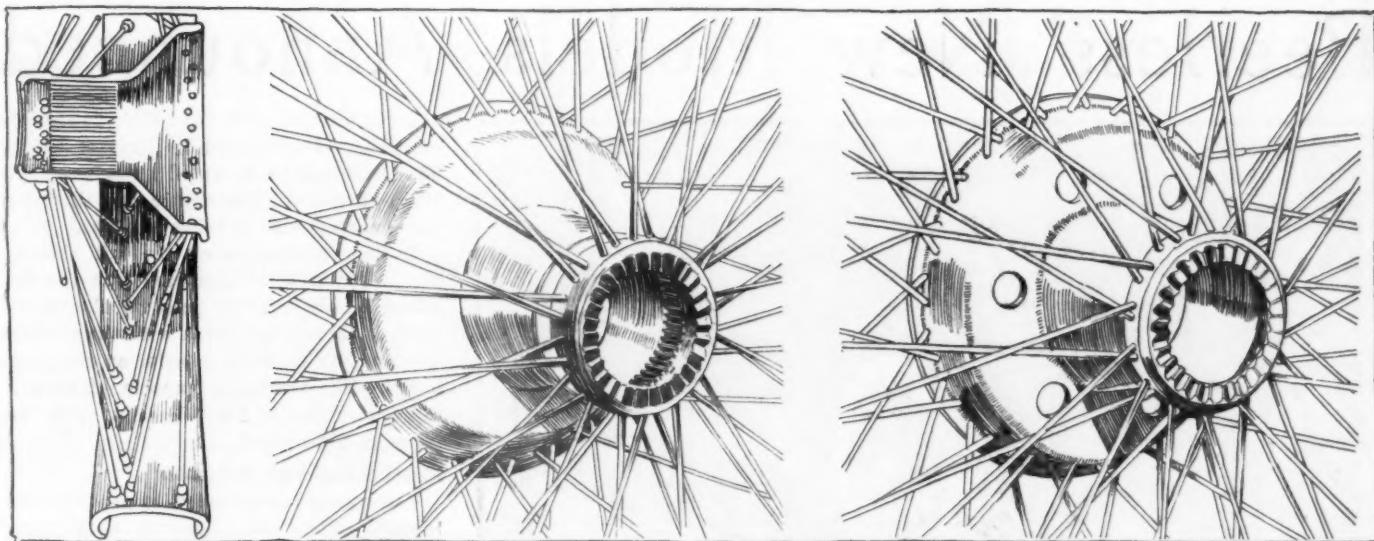


FIG. 3—SPOKE ARRANGEMENT OF TWO TYPES AND RILEY DRIVE
Reading from left to right, Rudge-Whitworth, Riley double-spoke showing also serrated drive; stud-drive type of Riley wheel

in operation; there is a tendency therefore, for the nut to revolve slowly in the opposite direction to that in which the wheel revolves. By selecting the threads in the proper direction this tendency is utilized to make the wheel stay in place when once screwed up.

Two driving mechanisms are provided for the Goodyear detachable wire wheels: The key drive, is shown in Fig. 1. In this the keys, A, fit into suitably shaped grooves B in the wheel hub.

The serrated drive, Fig. 1, somewhat resembles the Rudge-Whitworth in that the serrations L on the axle hub, fit into similar ones at K inside of the wheel hub.

Goodyear Wire Wheels

In the type 10, the regular Goodyear practice is reversed by putting the driving studs on the brake drums, as shown in Fig. 2, and the holes in the shell. In addition to the driving studs the inner hub and wheel shell have a slight taper to relieve any possibility of stress on the driving pins.

The locking device is illustrated in Fig. 2. The method of attaching and detaching is simple. When the wrench is placed on the cap, the incline plane H on the wrench presses the plunger bridge and takes the secondary security lock G out of engagement. The turning of the wrench cam B, vertically disengages the primary lock D and plunger bridge E from the ratchet teeth on the hub. The cap is permanently retained on the wheel by a locking ring, and then is free to rotate and allow the wheel to be drawn on and off. This left-hand threaded locking ring, which is doubly secured on the cap, must first be removed if ever the cap requires to be taken off the wheel. Its function is to retain the cap on the wheel and to withdraw the wheel from the hub when the cap is rotated. The safety of the wheel in no way depends upon this ring. When the wheel has been placed on the hub and tightened by rotating the cap, the

cam B is turned at right angles to the wrench and the plunger pin shoots up and draws the locks into engagement, and also draws the two locking pins F inside the cap. The wrench is then releasable.

Details of Riley Wheel

Three styles of wire wheels are made by Riley Ltd. These include, two detachable types; one with stud drive, and the other with a serrated driving hub; and a fixed wire wheel.

The stud drive wheel is shown in Fig. 4, dis-assembled from its hub, inner hub or axle. Permanently fitted to the inner hubs are the brake drums, bearings, speedometer, fittings, etc. The outer, or removable hub, which is built into the road wheel, is mounted upon the tapered seating of the inner hub, the projecting studs of which engage with the corresponding holes in the outer hub. These studs are tapered to a considerable degree to facilitate quick locating. It is claimed that the tapered seating takes practically the whole of the drive, and relieves the studs to a corresponding degree.

Each wheel is provided with a permanently attached hub cap, which is screw-threaded, to screw onto the thread of the inner hub. Self-contained in this hub cap

are the automatic and positive locks, and also the withdrawal device. The outer shell has ratchet teeth cut on its end face, Fig. 3, which are adapted to be engaged by the plunger pawls of the hub cap. These pawls are pressed into engagement by large flat springs, and, one of the pawls is fitted with a swinging cover, which not only insures that its pawl is locked positively, but it further prevents the wrench being removed from the hub cap until one of the pawls is in positive engagement quite independent of spring action; the other pawl is in actual spring engagement.

Riley Serrated Drive

The Riley detachable wheel with the serrated drive, is a new type introduced at the request of some motor car makers desiring the tapered seating, but preferring invisible driving means. In this wheel, Fig. 3, the serrations take the form of a ring of gear teeth, formed solid in both inner and outer hubs.

Another type manufactured abroad is the Dunlop, a distinctive English make. It is made in triple-spoke form with a demountable hub, much the same as the Rudge-Whitworth. The demountable inner hub of the Dunlop here illustrated.

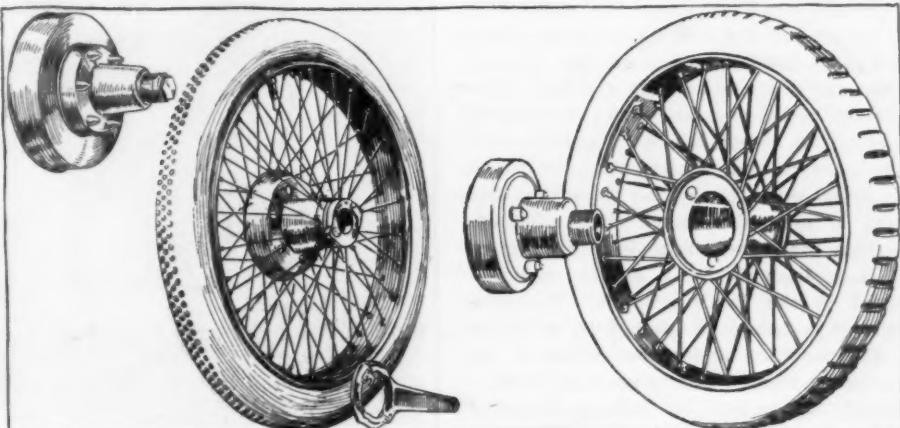
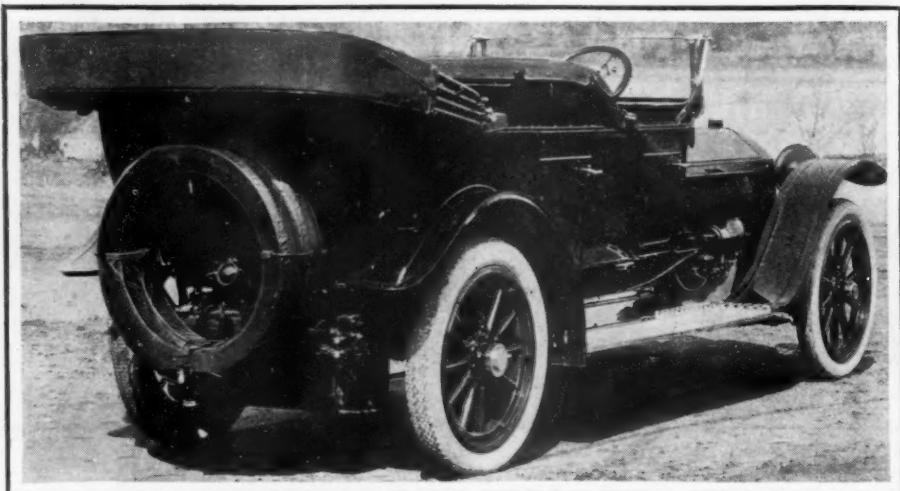


FIG. 4—TWO STUD DRIVES
Riley wheel and stud-drive hub at left; Goodyear stud-drive at right

Peerless' New Models Announced



THREE-QUARTER VIEW OF PEERLESS 48

SIxes exclusively is the slogan of the Peerless Motor Car Co., Cleveland, O., in announcing its line of three new models the 38, the 48, and the 60. In general design these cars may be said to be identical. Although no radical changes have been made in the design of the motor, there are little additions, and parts have been re-designed wherever it was deemed advisable.

Of the three new models offered, the 48 perhaps is the most popular. The motor of this car has its cylinders cast in pairs, the dimensions being $4\frac{1}{2}$ by 6 inches, bore and stroke. The cylinders are of T-head construction and the total piston displacement of the motor is 572.5 cubic inches, this volume being capable in such a motor of producing 48.60 S. A. E. horsepower. The Peerless 38 has a bore of 4 and a stroke of $5\frac{1}{2}$ inches and is rated at 38.4 S. A. E. horsepower, while the biggest car of the line is catalogued at 60 S. A. E. horsepower, with its 5 by 7 inch bore and stroke. Aside from dimensions the motors of these cars are identical.

Some Motor Details

In all cases chrome-nickel crankshaft is suspended from seven plain bearings, the great bearing surface making for long life, and the number for rigidity. The camshafts have eight plain bearings to rest upon. These shafts, together with the magneto and pump shafts, are driven by spiral gears, the reason being that this type of gear gives much more quiet operation than the conventional spur gear.

Carburetion is by a device manufactured in the Peerless shops. This carburetor is fed by pressure from a copper tank suspended under the frame of the car at the rear. Uniform pressure is maintained, the means of gaining it being unique. The pump which supplies the air has at its end, as shown in one of the illustrations on this page, a check-

valve. This check valve is in the form of a ball-and-spring arrangement which may be adjusted so that any desired pressure may be had in the tank. When once set to give a certain pressure, it will not vary. As soon as the pressure becomes greater than the amount desired, the excess will pass through a cut-out in the air line. Usually a pressure of 1 pound is sufficient to keep the motor running properly. To assist in starting and also when high motor speeds are desired, there is provided an air adjustment on the dash. Oiling is by splash with an auxiliary oil tank on the left side of the motor.

Ignition on New Peerless

The new waterproof type of Bosch magneto is used on the latest Peerless models. This working in connection with a storage battery constitutes the dual ignition system. The battery is kept

charged continually by the generator, which is manufactured by Gray & Davis. The generator is mounted on a stand on the left side of the motor and operates the starting and lighting systems.

In the illustration of the left side of the motor, it will be noticed that the flywheel is toothed. A gear on the motor shaft is thrown into mesh with the toothed flywheel, by pressing a pedal on the foot-board. The starter is capable of operating the car for at least $\frac{1}{2}$ hour, with the gears in high speed.

Starting-Lighting Generator

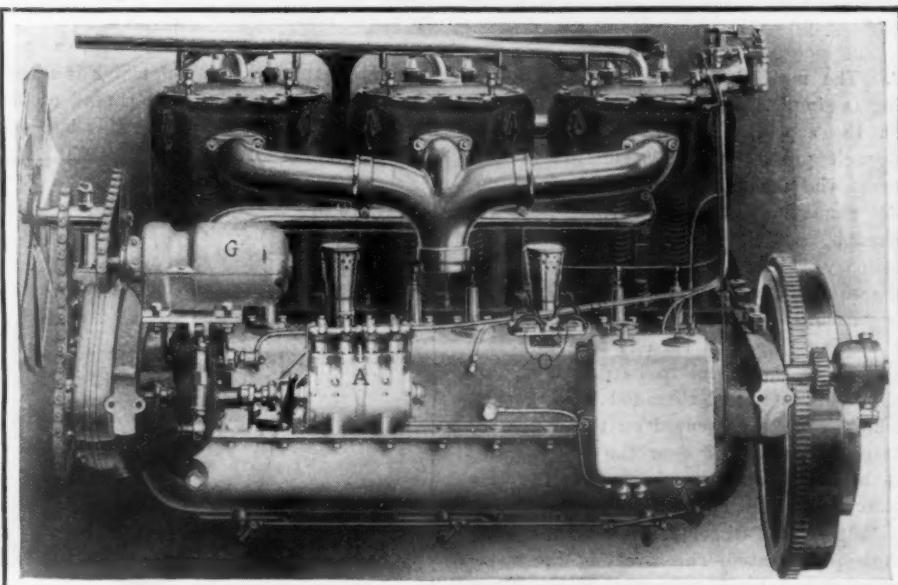
The generator supplies current to the battery which is common to both starting and lighting systems. It is of 120-ampere hours capacity and has a discharge rate of 15 amperes at 6 volts. When the battery is not supplying sufficient current for the lights, the generator automatically is cut into the circuit.

The point of introduction of the generator is predetermined, it being a place where the car is operating at 12 miles per hour, or under.

Another feature of the new line is the headlight reflectors. These are of the parabolic type and are provided with an adjustment by which it is possible to secure long distance rays as well as concentration near the car. The two-wire system is used in connecting the headlights, dash inserts and taillight.

Adhering to well-established Peerless practice, the expanding band type of clutch is used, and by the introduction of a double swivel joint in the shifter for support the action of the clutch is said to have improved considerably.

From the clutch the drive is through a four-speed selective gearset located amidships, then through the drive shaft



EXHAUST SIDE OF PEERLESS MOTOR
Showing generator, G, and air pump, A, and toothed flywheel for starting motor

to a floating rear axle. The latter is housed in an arched casing which has been made more rigid this year. In previous practice there was used a flexible coupling between the clutch and gearset, but this has been supplanted by a true universal.

Another noteworthy improvement is to be seen in the muffler. This is now made to lie lengthwise on the left side of the chassis, instead of crosswise and the interior of the muffler is removable for cleaning, a feature not possessed by the former type.

Change in Springs

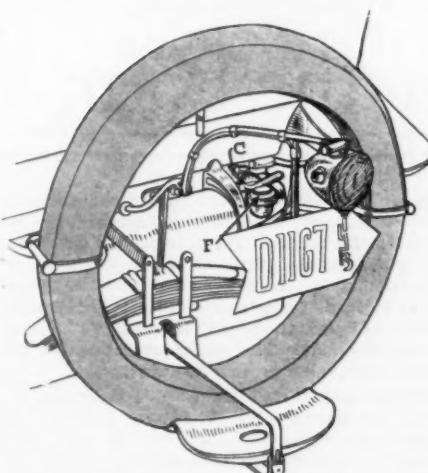
Instead of using a small number of thick spring leaves, there is in use now a large number of thin leaves, with the idea of adding to the flexibility and easy riding qualities of the car. Two types of shock absorbing devices are in use, Trauffault-Hartford in front and Gabriel rebound snubbers in the rear. The driving is accomplished by the use of radius rods.

The stock gear ratios of the 38, 48 and 60 are respectively, 3.6 to 1, 3.2 to 1 and 2.6 to 1. The chassis weights are given as 3,300, 3,800 and 4,100 pounds.

The steering post, together with the control lever and emergency brake lever, is on the right side. The 38 with a 125-inch wheebase is stock equipped with 36 by 4½-inch tires all around; the 48 has a wheelbase of 137 inches and leaves the Cleveland plant with 36 by 4½-inch tires in front and 37 by 5-inch in the rear.

The largest car of the line has a wheelbase of 148 inches and has 38 by 5½-inch tires all around.

In point of body design the most important feature of the new line is the extra tonneau seats, which are of new design, taking up little room when folded and at the same time are provided with arms, which make riding in these seats comfortable. In the new chairs one does not necessarily have to be a balancing artist to keep his seat when the driver takes a turn suddenly.



PEERLESS REAR END
Gasoline control valve C and filler cap F

All parts previously trimmed in brass will appear now in polished nickel and those parts which require enamel will be seen with black as the standard color. The hood is provided with a lock, which makes motor tampering by garage men impossible, almost.

Federal Bill Against Fraud

Washington, D.C., May 3—Agitation in favor of the enactment of a federal law prohibiting fraud upon the public by requiring manufacturers to certify to the materials of which a manufactured product is composed and to compel manufacturers to place their names upon manufactured articles or containers, has been renewed. Congressman Campbell, who introduced a bill to this effect during the last session of congress and which aroused much interest throughout the country, has reintroduced the measure and is marshaling his forces to bring the matter to a head in congress.

The object of his bill is to amend section 1 of the act to regulate commerce, approved February 4, 1887, so that it shall be unlawful for any person, firm, company or corporation to place upon the market

for interstate or foreign commerce any product of manufacture without accompanying the article with a certificate setting forth the material or materials of which the article is made, and printing, embossing or stenciling the name and address of the manufacturer upon such article or commodity. The provision is made that if it is impracticable to place the name of the maker on the article itself the name shall be placed upon the wrapper or package containing the article.

The Campbell bill also makes it unlawful for any person, firm, company or corporation to erase or change the name of the manufacturer or manufacturers of any article entering into interstate or foreign commerce. Any person, firm, etc., offering for sale or rent or otherwise disposing of any property intended for interstate or foreign commerce shall furnish therewith the name and address of the manufacturer of such article or commodity.

Nothing in the act is to be construed so as to prohibit such manufacturing firms placing any other name, as dealers, upon the articles of manufacture in addition to the name of the manufacturer. Violations of the law will subject the violator to a fine not exceeding \$1,000 or imprisonment for a period not exceeding 6 months, or both fine and imprisonment. The proposed law is to take effect from and after its approval by the president of the United States.

WILLYS TELLS OF FOREIGN TRIP

Toledo, O., May 5—"Europe, and especially England, is well aware of the fact that, without quantity production, it is far outclassed when in competition with the United States in the manufacture of medium-priced but high-grade cars," said John N. Willys, president of the Willys-Overland Co., on his return from a tour of Europe extending over several months. "The conservatism of centuries of intensive farming and intensive manufacturing methods has done its work. Though a few of the really progressive makers of the old world are keen to give the Americans an argument along quantity production lines, they are finding it difficult to interest sufficient capital to launch their enterprise on a really aggressive basis. And, from all appearances, it will be several years before they can accomplish their purpose.

"This must not be taken to mean that Europe is not advancing in the motor car industry. It is, and that rapidly. In my tours of various plants in Italy, France and Germany, especially, I gathered a number of excellent ideas which will be adapted to American manufacture with good results. I was able to find but one point in which the old world motorist has the advantage over the American, and this is in the matter of roads. European highways are among the best in the world, but, with the spirit of progress that is now being manifested in road building, in this country, we should soon catch up with the procession."



TWO FEATURES OF NEW PEERLESS MODELS

Tonneau seats with arms and air check valve for keeping constant pressure in gasoline tank.



From the Four Winds



KANSAS Stages Early Run—On May 9, a run under the auspices of the Kansas State Automobile Association will be made from Kansas City, Mo., through northeastern Kansas and north to Omaha, Neb. It is expected that close to 100 cars will participate. The run is the first of the present season.

San Antonio to Have Speedway—The San Antonio Automobile Club and the Texas State Highway Association have under consideration the construction of a 2-mile speedway there to take the place of the present short racing course. The proposition is being urged by Dr. W. A. Hering, president of the club, and by John W. Warren, president of the association. It is meeting with enthusiastic endorsement.

Canadian Organization Forming—The initiative has been taken by the Ontario Motor League, Ontario, Can., for a national association, a federation of all the clubs throughout the dominion, and the matter now rests in the hands of the smaller motor clubs, which are considering the project. The idea is to organize the many Canadian clubs so as to enable them to exert more influence in voicing the interests of Canadian motorists.

Motor Police in Bangor—Mayor Beal of Bangor, Me., has appointed five members of the Bangor Automobile Association special policemen to see that the laws are enforced, particularly against boys who jump on cars or throw their caps into passing cars in order to try to get a ride. The motorists complained of these things, but the difficulty came in there not being enough policemen on hand. The motorists now plan to make the arrests and get the courts to aid them in stopping the practice.

Track to be Opened by Governor—Ernest Lister, governor of the state of Washington, has promised to open the new Montamara race track near Tacoma on July 5, by circling the course at considerably less than 1 mile a minute. Bob Burman will pilot the state's chief executive. Petitions have been signed by over 2,000 persons asking that no races take place on Sunday, but after a 4 hours' session the directors have decided that their dates will not be changed and the races will be held on Sunday afternoon, July 6.

Begin Savannah Reservations—Seven months in advance of the Thanksgiving week grand prize and Vanderbilt races a box for the event has been reserved. From Brunswick, Ga., comes the man who is so much interested that he takes time by the forelock and requests A. W. Solomon, secretary of the Savannah Automobile Club, to save him the first box in the grand stand. The reservation is made in the name of S. K. Brown, of Brunswick. He has been given assurance that the very best box that is left after the honor guests and dignitaries have been provided for will be set aside for him.

Kansas Plans Endurance Run—The Kansas State Automobile Association is planning a sociability and endurance run from Kansas City, Mo., to Colorado Springs, Col., beginning on August 5, which is promised to eclipse anything ever attempted in a cross-Kansas run. D. E. Watkins, secretary of the association, expects that at least 150 cars will be entered in the sociability run, and that twenty-five cars will be entered for the endurance run. The start will be made from Kansas City the morning of August 5. According to the present schedule Topeka will be made the noon control, reaching Emporia

by night. The night control on the 6th will be Hutchinson; on the 7th, Garden City; on the 8th, La Junta, Col., finishing in Colorado Springs on the 9th, where the motorists will disband. It is expected that at least one car from every one of the seventy-three county organizations will be entered in the sociability run. The endurance run will be under the rules of the A. A. A.

Hoosiers Get New Tags—The secretary of state of Indiana received bids May 1 for 35,000 motor car license tags. A new law goes into effect July 1, requiring an annual state license on motor cars. The 1913 motor car tags will have the figures in black on a bright yellow background and the letters IND in yellow on a black background. The tag also will contain the year. The new licenses, with the exception of those for manufacturers and dealers, are based on horsepower.

Canadian Premiers Receive Cars—Presenting motor cars to premiers is a very pretty Canadian custom. Not long ago Sir Wilfrid Laurier, who never has been a wealthy man, was given a handsome car by his friends in Ottawa. A few days ago Sir James Whltnay was presented with a car by the conservatives in the Ontario legislature. This has more than ordinary significance. It means the undoing of Sir James, who for many years has preserved a great distinction as the only premier in Canada addicted to the bicycle.

High School Offers Motor Course—A special course in the gasoline engine and its application to the motor car has been started at the Manual Training High School in Indianapolis, one of the few high schools in the United States to give attention to the subject. The new course started May 1. The course is under the direction of A. C. Hirschmann, teacher of machine fitting in the high school. The course is open to all boys who are members of the machine fitting classes. A Studebaker 20 chassis, a half-size sectional drawing of the chassis and a Schebler carburetor are being used.

Bay State A. A. Outing—President E. A. Gilmore and the committee on runs and tours of the Bay State Automobile Association are working on the annual outing which is to be held at Spofford Lake, N. H., June 16, 17 and 18. The plans call for motoring from Boston, a distance of about 75 miles, on Saturday afternoon or Sunday and spending Monday and Tuesday there, the latter being a holiday in Massachusetts. On Monday the annual ball game between the married and single men, that has been a feature for some years, will be played. The committee expects to get seventy-five or 100 dealers and their families on the trip.

Tobacco to Pay for Roads—A tax on tobacco the proceeds of which it was proposed would go toward building a national highway from ocean to ocean, was suggested at the second annual convention of the National Old Trails Road Association held at Kansas City, Mo., last week. The suggestion, which was amplified at the meeting, was made by former congressman, J. M. Miller of Kansas. An enthusiastic gathering of old trails road supporters was represented at the meeting, and much of the time of the convention was spent in addresses by presidents of state old trails and highway associations. The convention lasted 2 days. Judge J. M. Lowe of Kansas City was re-elected president of the association without opposition. The other officers chosen were

as follows: Frank Davis, Herington, Kan., secretary; E. S. Ralph, Springfield, Ohio, treasurer; C. N. Cotton, Gallup, N. M., first vice-president; Miss Elizabeth Gentry, Kansas City, honorary vice-president, and Walter Williams, advisory vice-president.

Plan to Revive Racing—There is a plan on foot to revive motor racing in Boston and have some meets at Readville race track again on the holidays. James F. Kerr, who managed the Rockingham park events last fall, is behind the plan, and he is trying to form an organization to finance the scheme in time to have some events on May 30, June 17, and a 2-day meet on July 4-5. Some of the Boston dealers look upon the idea favorably.

Omaha-Denver Run—That the Omaha, Neb., good roads sociability run to Denver will not be taken until after June 15, practically was decided recently by the good roads committee of the Commercial Club. A committee was appointed to fix the date and make plans. It is thought a score or more cars will join in the run. Denver, Colorado Springs and other cities have invited them to be their guests. A smoker and other attentions will be given the Kansas City, Kan., party, May 10.

Georgia Registrations Pass 20,000 Mark—There are now 20,012 licensed cars in Georgia. This represents an estimated investment of \$25,000,000. The 20,000-mark was reached and crossed May 5. More than 3,000 cars have been put into commission in this state during the present year. The average daily number of licenses issued for the period has been about thirty. The state collects a \$2 fee for every license. Since the passage in 1910 of the law which requires all cars to be licensed by and registered with the secretary of state the fees collected have amounted to \$40,024. This money goes into the state treasury.

Forcing Signboarding in Kansas—A warning to boards of county commissioners in Kansas has been issued by the Kansas State Automobile Association with reference to designation of state and county roads by the boards. In fifty-six counties of the state the law providing for such designation has been complied with, but the remaining forty-nine counties have not complied with the law. The association will see that none of the money collected by the counties under the new state registration law is used except upon the maintenance of state and county roads, and until such are designated, that none of it be used at all in the counties that have failed to comply with the law.

Veterans Meet at Chattanooga—1913 is the semi-centennial of the famous battles of Chickamauga, Missionary Ridge and the Battle Above the Clouds on the heights of Lookout mountain. To people of the southland the topic of greatest interest at this season of every year is the reunion of these veterans in gray. But this year the event is of wider interest because the reunion is held for the first time since 1890, on the ground hallowed by the valorous deeds of both north and south. Hence there will be an attendance of survivors and descendants from all over the country. The Chattanooga reunion will be the crowning event in the lives of the survivors, who are now passing away so rapidly. For most of them it will be their last pilgrimage to the ground they made sacred by their heroic deeds 50 years ago. They will find the famous battle grounds beautified by monuments in marble

Recent Club News

THE Champaign County Automobile Club of Champaign, Ill., has purchased 100 danger signs which will be installed at all dangerous crossings in the city and country. The signs are painted in red enamel. Permission has been secured from the street railway company to place the signs upon the poles of the company at corners where the warning is necessary.

The first endurance run of the season by the McLean County Automobile Club, Bloomington, Ill., will be given on Thursday, May 15. The trip will cover 160 miles and will require about 9 hours to complete. The winner will be awarded the Veldt silver cup, three successive winnings of which give permanent ownership. It is thought that about fifty car owners will participate.

The Aurora Automobile Club of Aurora, Ill., has sent out 5,000 "suggestion" cards to members. It is desired that those receiving these cards write thereupon the location of holes in pavements or highway, uneven places in the pavements or other road defect. The secretary of the club, after receiving these suggestions, will forward them to the proper officer for attention. It has also been decided to push a campaign for 1,000 additional members. Runs will be made during the season to Plano, Sandwich, Yorkville, Hinckley, Naperville, Plainfield and other adjacent cities, and help organize a motor club in each city to be affiliated with the Aurora club. The club also will send a delegation to Springfield to lobby for the Tice good roads bill.

During the past week the Decatur Automobile Club of Decatur, Ill., has forwarded 500 letters to farmers of Macon county, expressing the merits of the Tice good roads bill and urging them to use their influence to secure its adoption. All farmers who favor this measure are urged to notify their representative. The response has been gratifyingly large and a large proportion were forwarded to the members of the legislature, with a request that the Tice bill be supported.

In order to push a membership campaign which has been launched by the Columbus Automobile Club, of Columbus, Ohio, H. K. Laird, formerly connected with the good roads movement in Ohio, has been made general manager of the club. It is proposed to double the membership of the club during the coming season, and to that end all of the members, numbering more than 600, have been asked to hustle. The club has established a bureau for the distributing and collection of all touring information and also has taken up the matter of races, deciding to promote a 200-mile race at the track of the Columbus Driving Park July 4.

For the purpose of securing better roads for Arizona and the more extensive use of roads that this state already has, the All-Arizona Automobile Association has been formed. The Maricopa Automobile Club is the Phoenix local of that organization. Branches are to be organized in Tucson, Bisbee, Douglas, Yuma, Prescott and other cities of the state. Jack Holmes, secretary of the Maricopa club, is now making a tour of Arizona for that purpose. As a result of the perfection of the A. A. A. organization, this will be a busy summer in Arizona.

and bronze, made accessible by electric cars and gridironed by over 110 miles of model motor roads, built by Uncle Sam's engineers. These roads include the celebrated Crest road along the top of Missionary ridge, and are supplemented by \$1,000,000 worth of asphalt—macadam and chert boulevards lately built by Hamilton county.

Motor Vehicles Damage Railroad—Railroads of Nebraska are facing grave problems in competing against the motor car, says General Passenger Agent P. S. Eustis of the Burlington, who appeared before the state railway commission at Lincoln, Neb., to fight Otoe county citizens who are trying to obtain increased passenger service between Lincoln and Nebraska City. "So intense has become the competition between the two," Mr. Eustis told the commission, "that the other day, for instance, at a hearing held in Iowa in a case similar to this, seven of the ten complainants came to the point where the hearing was held in motor cars, rather than on the train which arrived an hour before the matter was to come up."

GOVERNORS WHO MOTOR—HALL OF LOUISIANA



WHEN Governor Hall of Louisiana was making the race for the office he holds there was every prospect of a close vote. Louisiana's railroad mileage for the most part is in trunk lines. There are few branches and as a consequence a great many of the towns cannot be reached by rail. Governor Hall, against the advice of many of his friends, decided to campaign in a motor car despite the tales of bottomless roads and bridgeless streams.

A car was selected and equipped with a block and tackle and a number of planks. It was an exceptionally rainy season. Navigation is the term which best describes the progress made by the campaigning party through many of the parishes. All hands took turns running the car, the governor included. It was real work to hold the wheel on the rough and slimy roads. Frequently the crew, alternately stump speakers and chauffeurs, would have to climb down into the mud, throw their tackle around the nearest tree—fortunately there always is a tree near at hand in Louisiana—lay down the planking and get the car out of the slough. Often Judge Hall was called upon to push when the motor was unequal to the task.

Good Roads Brevities

SATURDAY, May 31, has been designated as reopening day at the Milwaukee Automobile Club's country place at Blue Mound road and Cottrill avenue, town of Wausatosa, 4 miles from the Milwaukee city hall. The club will be informally opened about 10 days prior to May 31, on which day a large family party will be given to members. In 1912 the club was opened for the season on April 20, but 23 days of rain almost immediately thereafter made the early opening unprofitable. The club honors membership cards in all clubs or associations affiliated with the American Automobile Association, giving bearers of such cards all the privileges of the clubhouse on the same basis as the club's own members. The clubhouse has been decorated with a collection of pennants and framed photographs representing practically every motor car manufacturer in the United States.

The motor car owners of Belleville, Ont., organized recently a motor association to be known as the Quinto Motor Club. These officers were elected: President, Dr. C. Gibson; first vice-president, L. B. Cooper; second vice-president, G. A. Bennett; secretary-treasurer, H. F. Ketcheson. Hon. Sir MacKenzie Powell and Nathaniel Varmillyea, president of the Ontario Good Roads Association, were chosen honorary presidents.

To increase the good roads mileage in the immediate vicinity of New Orleans is to be the chief aim of the Louisiana Motor League for the next year. At the annual meeting of the league last week arrangements were made for direct cooperation with the city and parish authorities. For each dollar voted for road improvement the league will contribute an additional 50 cents. P. M. Milner was re-elected president of the league.

The members of the Akron chamber of commerce, of Akron, Ohio, have started a subscription to be used in the improvement of the roads of that section of the state. The plan is to secure 3,500 people to give \$5.00 or more each to a fund to be used under the direction of the chamber of commerce.

A recent fire that destroyed the industrial buildings of the Kansas state penitentiary will prevent the use of convict labor on the state roads, which was authorized by the last legislature. For the next year it is likely that all the persons who would have been put on road work will be needed in rebuilding the burned buildings.

It is estimated that the state tax to be paid by motor car and motorcycle owners in Kansas will drag 150,000 miles of highway fourteen times in the course of the year. A close watch will be kept on the officers who have the handling of this fund to see that it is used for the purposes specified by the recent law—for the maintenance and not for the construction of highways.

Progress is being made with the plans for the construction of a highway for the exclusive use of motor cars between Dallas and Fort Worth, Texas. It is planned to support the road by charging tolls for its use. The proposed road will be 34 miles long, 18 in Tarrant county and 16 in Dallas county. The commissioners' court of Tarrant county has already let the contract for the construction of a macadamized road to the Dallas county line to cost \$94,000.

tense white or bluish light, similar to the light of electric lamps. The new fuel is a development of this gas process.

Increases Capital Stock—The Suspension Roller Bearing Co., Sandusky, O., has filed papers with the secretary of state increasing its capital stock from \$250,000 to \$350,000.

New Wisconsin Enterprise—The Petroleum Universal Power and Heating Co., New Richmond, Wis., is being organized by capitalists of New Richmond, Wis., and Minneapolis and St. Paul, Minn., with a proposed capital of \$500,000, to manufacture devices and appliances invented and designed by E. J. Bell, of New Richmond, which make possible the substitution of cheap fuels in place of gasoline. Patents have been applied for by Mr. Bell. The basic idea of the appliance is to produce a superheated kerosene vapor for use as fuel and illuminant.

In the Motor Car Industry

deal in gauges; incorporators, A. D. Dickerson, C. F. Brown, H. M. Moorhead.

New York—Still's Automobile and Accessories Co., capital stock, \$10,000; incorporators, G. M. Still, G. E. Still, J. H. Still.

New York—Gaulois Tire Corp., capital stock, \$20,000; to deal in rubber products; incorporators, V. W. Cutting, M. Leon, J. Grenier.

New York—Schermerhorn Garage Co., capital stock, \$20,000; incorporators, J. Ginsburgh, L. Rossetti.

New York—Tarrytown Motor Car Co., capital stock, \$250,000; incorporators, W. Odell, B. J. Knerr, A. M. Levy.

New York—Gerleit Auto Spring Wheel Co., capital stock, \$200,000; incorporators, A. Gerleit, M. Vath, H. Heil.

New York—National Spark Plug Co., capital stock, \$10,000; to deal in motor car supplies; incorporators, R. L. Cherburg, C. B. N. Bennett, A. Boscelman.

Philadelphia, Pa.—Richmond Hill Garage and Machine Co., capital stock, \$8,000; to manufacture machinery; Incorporators, C. H. Ryan, A. F. Ryan, M. E. Tunon.

Pittsfield, Mass.—City Garage and Sales Co., capital stock, \$50,000; directors, W. G. Venn, M. H. Ward, H. N. Stackpole.

Portland, Me.—Miles B. Mank Motor Car Co., capital stock, \$10,000; directors, M. B. Mank, C. F. Mank.

Syracuse, N. Y.—Bendring Mfg. Co., capital stock, \$50,000; to manufacture piston rings and engine parts; incorporators, J. C. Cowies, W. R. Walker, A. L. Jones.

Troy, N. Y.—Grand Street Garage, capital stock, \$3,000; incorporators, S. W. Smith, W. C. Swartfourt, M. J. Cohen.

Utica, N. Y.—H. D. Crim Auto Co., capital stock, \$20,000; incorporators, H. D. Crim, C. W. Crim, F. Crain.

Webb City, Mo.—Empire Automobile Co., capital stock, \$10,000; incorporators, W. L. Miller, J. Caelzar, M. S. Miller.

Wilmington, Del.—Lovell-McConnell Mfg. Co., capital stock, \$2,000,000; to manufacture motor cars; incorporators, H. E. Latter, W. J. Maloney, O. J. Reichard.

Wilmington, Del.—International Specialty Co., capital stock, \$100,000; incorporators, R. B. Cooling, C. J. Jacobs, H. W. Davis.

C. W. Arnquist, of New Richmond, will be president of the company. Definite plans for factory and marketing have not as yet been made.

Fires Scare Insurance Companies—Because of the large number of motor cars destroyed by fire in Montgomery, Ala., seven of the insurance companies handling this branch of business have declined to issue further policies. Nine cars were burned within 40 days. Previous to this time the rate has been nearly this high. The cause given is carelessness and the lack of providing fire-proof garages.

Drawback for Briggs-Detroiter—A ruling has been made by the treasury department at Washington that a drawback shall be allowed under section 25 of the existing tariff act on motor cars and motor car engines manufactured by the Briggs-Detroiter Co., of Detroit, Mich., with the use of imported annual bearings. The allowance is not to exceed two imported annual bearings to each motor car or engine exported. The makers' sworn statement bearing on the subject has been filed with the collector of customs at Detroit.

Times Square Expansion—The Times Square Automobile Co. of New York and Chicago, which recently purchased the buildings at Broadway and Fifty-sixth street, New York, formerly occupied by Wyckoff, Church & Partridge, is about to begin the construction of two additional stories to the rear building. When completed this will give the company more than 100,000 square feet of floor space to be devoted to its business of wholesaling and retailing new and used cars. One section will be devoted to a distinctive department for export trade in used cars.

Illinois Dealers Again Active—After a 3 months period of inactivity, due to the necessity for looking after the spring business, the executive committee of the Automobile Dealers' Association of Illinois met at Decatur last week and arranged for regular monthly meetings thereafter. Much interest was displayed in the proposed national organization of dealers and which will be organized at Indianapolis on May 29. It was voted to endorse this national body and send delegates to represent Illinois. At the next monthly meeting, to be held at Wilmington on May 21, these delegates will be chosen. The Tice road bill, now before the legislature, was endorsed and it was voted to distribute a synopsis of this bill to all members, with a request that they be posted

in all garages in order to inform as many persons as possible concerning the text of this proposed measure. Seven new members of the state association were reported.

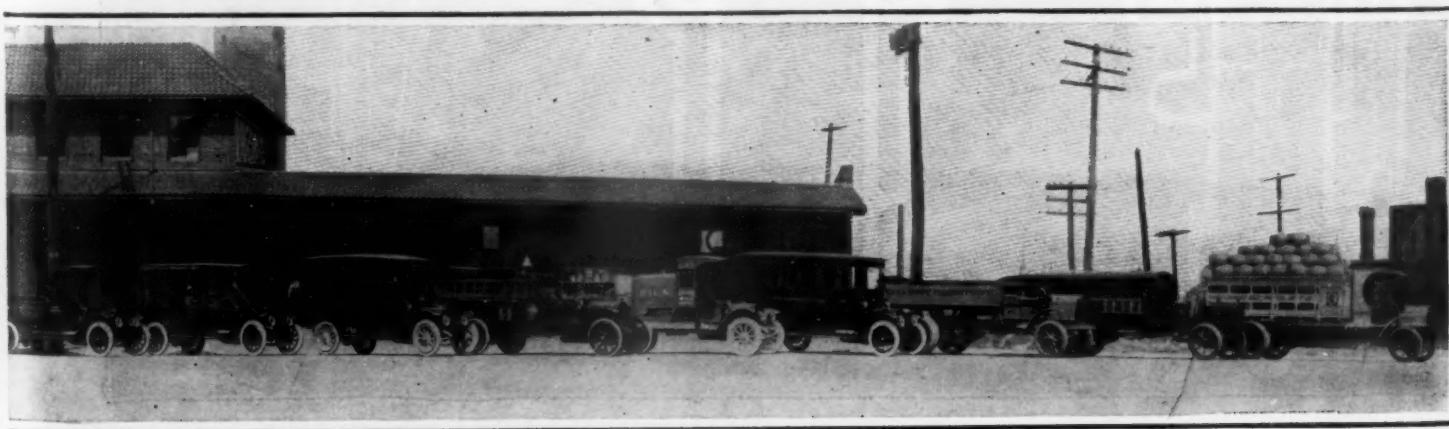
Fire in Truck Plant—The Universal Machinery Co., 1916 St. Paul avenue, Milwaukee, builder of Progress motor trucks and parts, sustained a loss of \$5,000 by fire last week. Several departments suspended operations for 10 days while repairs were under way.

Wilbur with Empire—Lawrence R. Wilbur, of Indianapolis, has been made assistant general manager of the Empire Automobile Co. of Indianapolis. Mr. Wilbur will have direct charge of the business management of the Empire company's executive office, which will permit C. E. Gibson, general manager, to devote more time to pushing the production end of the Empire.

Tracy Broadening—Joseph Tracy, of New York, consulting engineer, has been again compelled to move his testing plant and laboratory to larger quarters. At the new plant six to eight motors may be tested simultaneously, and there are special facilities for making investigations on motor fuels. The equipment includes torsion, reaction, fan, electric and hydraulic dynamometers, one of the latter having a maximum capacity of 500 horsepower.

Move to Indianapolis—The Miami Cycle and Mfg. Co., motorcycle manufacturer of Middletown, O., has leased half of the old plant of the Prest-o-Lite Co., in East South street, Indianapolis. The company will move there and begin operations about August 1. Later the company will build a larger and permanent plant at Speedway, the horseless city. The other half of the old Prest-o-Lite company was leased recently to the Esterline Co., Lafayette, which manufactures electric starting and lighting devices.

Case of Interest to Dealers—A case of unusual interest, the outcome of which is eagerly awaited since the decision favorable to the plaintiff would establish a precedent, is that of L. H. Elmer, manager of the Elmer Automobile Co., Hartford, Conn., Ford dealer, who applied for and was granted an injunction against Harry Starkie, his former salesman. Elmer alleges that Starkie, the last week he was in his employ, copied a list of his, Elmer's, prospects. Starkie entered the service of the Palace Automobile Service Co., Inc., as a salesman. Elmer, in his application for the injunction, alleged that Starkie has since used the copied list of prospects to the detriment of his former and benefit of his present employers. Judge Edward L. Smith of the court of common pleas heard the case and granted the injunction. Friday of last week Starkie applied to Judge Smith for dissolution of the injunction.



THE WHITE COMPANY, WHICH WERE DISPLAYED AT THE RECENT TRUCK SHOW AT PITTSBURGH



The Motorist's Kindergarten



EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

MOST of the motors on the cars of today are of the poppet-valve type, that is they employ poppet valves for the admission and expulsion of the gas. These poppet valves are shaped like a mushroom with a very long stem. The round flat part at the top of the mushroom fitting into a seat, as it is called. When the valve is raised by a cam the flat part is lifted from its seat and gas is allowed to go in or out of the cylinder as the case may be. The valve is pushed back onto its seat again by the action of a spring. Non-poppet valve motors are in some instances replacing the older type because the latter is noisy and is not positive at high motor speeds. Instead of poppet valves, these have valves that operate more quietly and positively.

Among the non-poppet motors which have been brought to light is one which is known as the double-sliding-sleeve or Knight; then comes a rotary piston and still a third a rotary valve. The fourth and fifth types are the single sliding-sleeve and piston-valve types. It should not be inferred that there are only five non-poppet motors besides the two-cycle, for some new form of non-poppet motor is being patented each month.

Non-Poppet Valve Motors

The Knight motor, will be taken up in detail in the next issue of Motor Age, but it may be stated here that it is of the double reciprocating sleeve type. This means that there are two sleeves or hollow cylinders with slots in them inside the cylinders. The sleeves move up and down within each other, but they do not move together. While one is moving upward the other is moving downward. The slots in these sleeves coincide at some point. That is, the two slots are in line. When this condition exists gas may pass from one slot through the other and then into the cylinder. There are slots also for the exhaust side and when these are in line the burned gas may pass out through an exhaust pipe. So much for the fundamental principle of the Knight or double reciprocating-sleeve motor.

Rotary-Valve Motors

Another familiar type and that used also on a number of cars in Europe and the Speedwell car in America, is the rotary valve. By referring to Fig. 61 the operation of one type of rotary valve will be made clear. At D on the top of the illustration is shown the form of valve em-

ployed in the Mead rotary-valve motor. This cylindrical piece of metal takes the place of the poppet valve and the spring and all the other poppet mechanism. It will be noticed that there are long holes in the shape of slots, S, in this rod.

These holes are called the ports. The rotary-valve motor has two of these long pieces of metal one for the intake and the other for the exhaust. In the poppet motor of four cylinders there are four intake valves and four exhaust valves. In the rotary-valve motor instead of having eight there are two long rods each with four holes cut out. In other words the holes in the metal rods correspond to the mushroom or poppet valves themselves. At D is shown a valve for three cylinders. G is a coupling connecting the two parts. These valves, as stated before, fit snugly into openings in the side of the cylinder as shown in the illustration at B. The one marked I may be called the intake and the other marked E the exhaust valve. These rods have gears at their ends and these gears are operated by a chain from another gear on the crankshaft.

This means that the valves turn around when the motor is running. As the valve turns around the slots at some time or

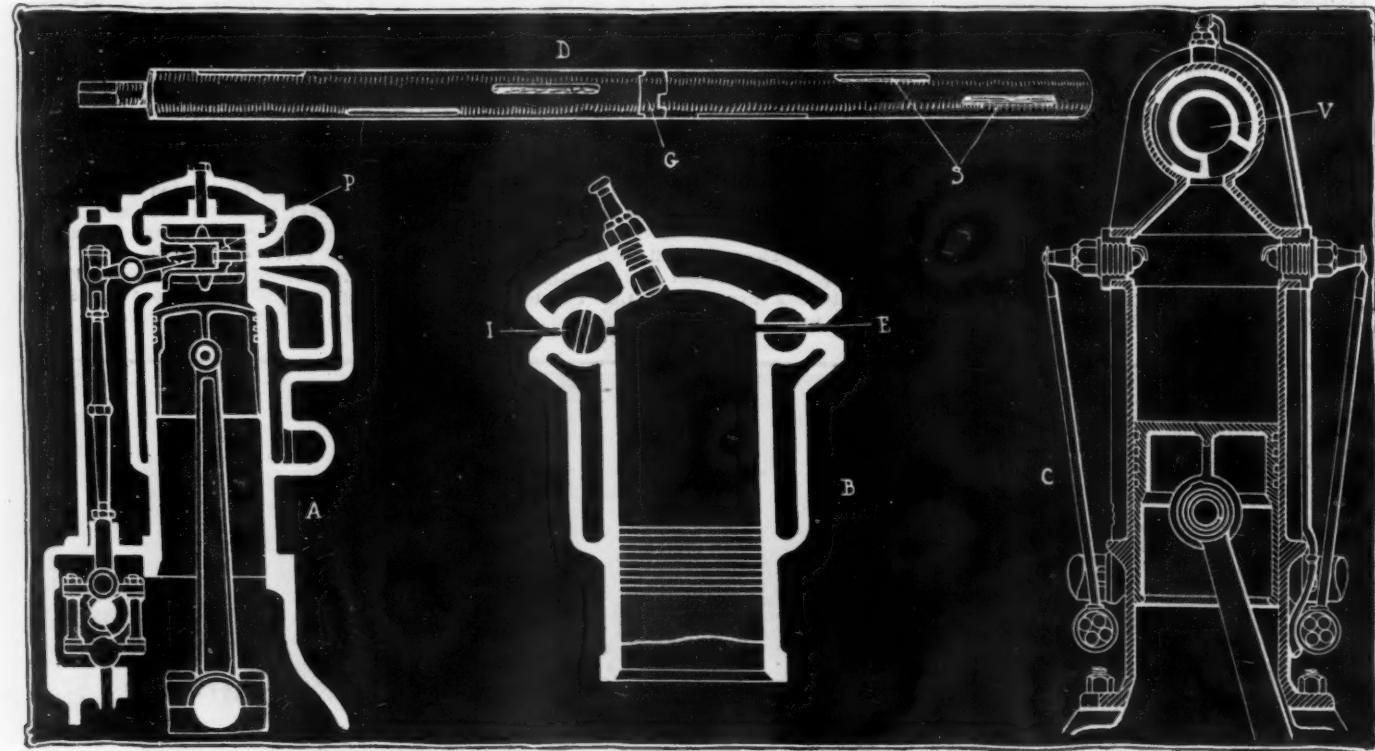


FIG. 61—THREE TYPES NON-POPPET VALVE MOTORS

At A is shown the piston-valve motor; at B, the rotary valve employing two rods; at C, the rotary valve with one rod; at D, detail of Mead valve

other are in line with the combustion chamber and at the same time with the intake or exhaust pipe as the case may be. Now as soon as the slot is in line as shown on the exhaust side of the illustration at B, the gas rushed through the slot and out through the exhaust pipe. If the intake slot of that cylinder is in line then gas will rush into the cylinder just as it rushes past an ordinary poppet valve.

Instead of having two rods with four slots in each there is another type of non-poppet motor which employs but one rod with eight slots. This one big rod, V, is placed on top of the motor as shown at C in Fig. 61. It operates in the same way that the two rods mentioned above.

That is, at its end there is a gear which is operated by chain from another gear. This turning around of the rod or valve constitutes the valve action. However, the construction of the single rotary valve is a little more complicated than the double one just described.

Single-Sleeve Valves

In the single-sleeve type of motor the valve action is different. The single-sleeve non-poppet motor has a sleeve or hollow cylinder with two slots in it. These slots are on opposite sides. One slot is higher on the sleeve than the other. Now this sleeve moves up and down, just like a piston. When it moves upward one of the slots coincides or lines up with the

intake pipe and the combustion chamber of the cylinder. As soon as this happens the gas rushes through the slot and into the cylinder. Then it explodes and passes out when the other slot is in line with the exhaust pipe and the combustion chamber.

In another type of non-poppet motor illustrated at A, a piston, D, moving back and forth in a cylinder on top of the regular cylinder operates the openings through which gas passes and goes out. The regular piston moves up and down, but the piston which operates the valves moves sideways. In one position the piston valve, as it is called, will admit gas to the cylinder and in another the exploded gas will pass through the valve.

Some New Ideas in Motor Car Details

Roller Bearing Needs No Grease

WHILE it is not the best policy to run any type of ball or roller bearing without lubrication, yet it is a desirable feature of any bearing if it is possible to run it without oil, without danger of damage. With this idea in view, the American Roller Bearing Co., Pittsburgh, Pa., has developed a so-called anti-friction roller bearing, which on test is said to have run 30,000 miles in a motor vehicle without lubrication.

Referring to Fig. 2, which gives a general idea of the American bearing, it will be noticed that there are alternate large rollers, A, which carry the load, and smaller rolls, B, which act as separators and which are grooved at their ends, so as to run in tracks, C. These spacing rolls, B, are held in place by retaining rings, D, which may move freely. Thus, it will be seen that this bearing consists of four principal parts: inner casing, bearing or load-carrying rolls, the spacing rolls and the bond rings. The inner casing is supported on the shaft, or axle, as the case may be, and it carries the load rollers. Bearing on this casing, there is also the track for supporting the idler rolls, and upon which they move freely as the bearing turns.

The anti-friction principle of the American bearing and that which the manufacturer claims makes it possible to operate it without lubrication, is that by separating the load rollers by the spacing rolls, preventing the contact of the load rollers, rolling contact is obtained between all moving parts. Since there is no sliding motion, friction and consequent wear heat is said to be reduced to the minimum. This rolling contact may be better understood when it is noticed that the spacing rollers necessarily must rotate in a direction opposite to that of the load-carrying rollers.

Bennett Rear Axle Gearset

A form of change-speed mechanism which is designed to be incorporated in connection with the rear axle in an integral housing, and which places the bevel

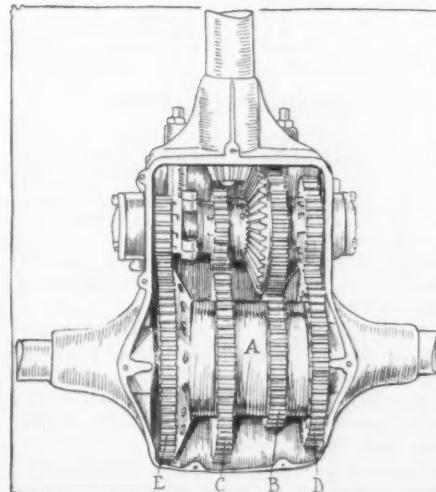


FIG. 1—BENNETT REAR AXLE GEARSET

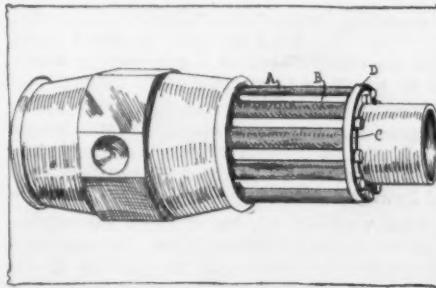


FIG. 2—AMERICAN NO-GREASE BEARING

driving pinion and its mating bevel gear forward of the shifting gears, while at the same time the differential gearing remains at the rear axle shafts, has been brought out by S. S. Bennett, Highland Park, Mich. In this unit the change speed gears are always in mesh.

In Fig. 1 a general idea of the Bennett construction is brought out. Speed combinations are obtained by the use of tooth clutches, the toothed parts of which slide on the shaft, while the mating members are integral with the change gears. To aid in the shifting of these clutches, the jaws are given a worm effect of 1-8 inch, with the idea of making them easy of engagement. Each clutch has six jaws.

With the Bennett arrangement, the driven gears are all made larger in diameter than the driving gears, with the view of equalizing the strain between the driving pinion and its spur gear. This is said to give the same result as the side-chain drive. The differential gear is carried within the drum, which surrounds the rear axle, the approximate location being indicated by A in the figure.

It is claimed for this arrangement that since the gearset is beyond the driving pinion and rotates one-third to one-quarter as fast, there is less shock to the mechanism. This speed difference is also said to render the gearing noiseless while running on the lower gears, as well as when changing speeds. The driven gears are all unhardened, which is a manufacturing consideration. Referring to the illustration, the direct drive gearing is shown at B, combination C gives low speed, while intermediate is obtained by D. The reverse is given through E by the use of a small pinion inter-connecting the two main gears and back of them.

Stanley Door Hinges

Instead of using malleable iron for hinges the Stanley Works, New Britain, Conn., uses cold rolled steel and it is claimed that this material together with the construction used produces a hinge that swings smoothly. The hinge is made 1½, 1¾ and 2 inch sizes, and 2 to 5 inches long.

The feature of the hinges manufactured by the Stanley company is the joint. This is so made that when the door is opened and closed there is not the rattle heard usually and the paint is not scraped from the barrel of the hinge. The offset pattern and straight pattern types are being marketed together with a number of special styles, which are made from the car manufacturer's specifications.

The Stanley company expects to manufacture approximately 400,000 pairs of these hinges this coming year and already has made contracts with a number of prominent car makers.



Brief Business Announcements



Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make	Town	Agent	Make
Alexandria, La.	Sloan Motor Co.	Kisselkar	Lake Charles, La.	Calcasieu Motor Co.	Kisselkar
Barre, Vt.	Barre Kissel Kar Co.	Kisselkar	Lebanon, N. H.	Smith Auto Sales Co.	Kisselkar
Beresford, N. D.	Motor Inn	Kisselkar	Lima, O.	Auto Sales and Supply Co.	Henderson
Birmingham, Ala.	Thomas E. Morris, Jr.	Little	Los Angeles, Cal.	Pacific Kissel Kar Branch	Kisselkar
Bridgeport, Conn.	Boulevard Garage	Kisselkar	Lynn, Mass.	Essex Automobile Co.	Kisselkar
Cadiz, O.	J. W. Robertson	Studebaker	Marietta, O.	Walter W. Wood.	Hudson
Cadiz, O.	J. W. Robertson	Mitchell	Merna, Neb.	B. S. Wells.	Little
Cadiz, O.	J. W. Robertson	Oldsmobile	Newark, N. J.	I. H. C. Motor Express Co.	Kisselkar
Cadiz, O.	George Sampson	Reo	Norfolk, Va.	Allen Motor Co.	Kisselkar
Cadiz, O.	E. M. Long & Sons	Overland	Paterson, N. J.	Taximeter Auto Co.	Kisselkar
Chadron, Neb.	O. U. Linington	Reo	Pittsfield, Mass.	S. W. Goodrich.	Kisselkar
Chadron, Neb.	O. U. Linington	Little	Phoenix, Ariz.	Carr Auto Co.	Hudson
Chicago	Centaur Motor Co.	R. C. H.	Phoenix, Ariz.	W. D. Tremains.	Pope-Hartford
Clarendon, N. H.	Earl F. Howe.	Kisselkar	Phoenix, Ariz.	Southwestern Motor Co.	Apperson
Dyersburg, Tenn.	J. S. Scott.	Kisselkar	Red Bank, N. J.	Southwestern Motor Co.	Bullock
East Orange, N. J.	Charles A. Dorer.	Kisselkar	Red Bank, N. J.	Fred H. Van Dorn.	Kisselkar
Eau Claire, Wis.	A. C. Jordan.	Kisselkar	San Francisco, Cal.	Rene J. Marx.	Mercedes
Erl, N. Y.	Wood & Gammon	R. C. H.	San Francisco, Cal.	Pacific Kissel Kar Branch	Kisselkar
Fort Worth, Tex.	Chandler & Hightower.	Kisselkar	Sioux City, Ia.	H. E. Blum.	Kisselkar
Grand Island, Neb.	Jarvis Bauder Auto Co.	Empire	Tempe, Ariz.	E. H. Spain.	Ford
Hemingford, Neb.	Harry O. Wildy.	Reo	Tucson, Ariz.	Underhill & Campbell.	Hupmobile
Hemingford, Neb.	Harry O. Wildy.	Little	Warrensburg, Mo.	H. R. Ogleby.	Kisselkar
Jamaica, Long Island	Consolidated Garage	Kisselkar	White Salmon, Wash.	G. A. Thomas.	Kisselkar

COMMERCIAL CARS

Blanco, Tex.	Charles E. Crist.	Wichita	New Orleans, La.	George F. Spence.	Wichita
El Paso, Tex.	Tri-State Motor Co.	Wichita	San Angelo, Tex.	Burt T. Jarvis.	Wichita
Hensonville, N. Y.	O. T. Barker.	Koehler	San Francisco, Cal.	Woodman Motor Truck Co.	Wagenhals
Hutchinson, Kans.	Buck & Co.	Wichita	San Jose, Costa Rica.	John N. Bliss.	Wichita
Jamestown, N. Y.	Star Garage	Koehler	Texarkana, Ark.	Arkansas Motor Co.	Wichita
Kansas City, Mo.	Essex Garage	Wichita	Topeka, Kans.	Billard Brothers.	Wichita

with headquarters at 3-5 Roncesvalles avenue. J. M. Shanahan will have charge of the business in Canada.

Cornwall, Ont.—A. C. Robertson, distributor for the Studebaker, has opened a garage on Pitts street.

Oakland, Cal.—C. F. Orra has taken the Krit agency for northern California and the Hawaiian Islands.

Painesville, O.—The Vulcan Mfg. Co. has been organized with an authorized capital of \$200,000 to manufacture cars and accessories.

Mayville, Wis.—The Badger Auto Co., handling Studebaker and Overland cars, has been established in a new garage which is 45 by 80 and two stories in height.

Detroit, Mich.—Sales Manager Paul Smith announces the appointment of Mr. Frank B. Willis as general factory representative for the Lozier company in all territory east of Denver.

New York—R. W. Hutchinson, advertising and publicity manager of the International Motor Co., has offered his resignation, which has been accepted by the officers of the company. He will sever his connections with the International on June 1.

Columbus, O.—The Guarantee Auto Tire Repair Co. has taken over the vulcanizing business at 149 North Fourth street, formerly operated under the name of the Auto Tire Repair Co. John Reed and John Hiltburner constitute the new company.

Columbus, O.—Announcement is made that L. W. Pitcher, who has been connected with the electrical department at the Minneapolis branch of the Columbus Buggy Co., has been made manager of the branch in the place of A. E. Archer, who resigned to take the St. Louis agency for the Ohio Electric Co.

Washington, D. C.—The business of the G. R. Cowie Co., Washington, distributor for the Cole, has been taken over by the G. R. Cowie Co., Inc., organized with the following officers: G. R. Cowie, president; L. Bert Nye, vice-president; E. S. Wolt, treasurer and W. H. Bennet, secretary. The

new company purchased the business of the G. R. Cowie Co. and the Standard garage, 2121 Fourteenth street.

Worcester, Mass.—The United States Tire Co. has opened a new branch here under the management of L. C. Havener.

Washington, D. C.—The Imperial Motor Tire Co. has succeeded the Imperial Motor Co., and will handle Shawmut tires.

Dallas, Tex.—H. C. Apgar, formerly manager of the Ford company in Dallas, has resigned and will enter the business for himself.

Battleford, Sask.—Property has been purchased on Fourth avenue by Christianson & Stephenson for the purpose of erecting a garage.

Washington, D. C.—James J. Flynn, formerly manager of the Locomobile branch here has been appointed eastern sales manager for the Standard Electric Car Co. and will have headquarters in this city.

Columbus, Ohio—The Rogers Supply and Tire Co. has purchased a portion of the stock of the Gaeth Motor Car Co., of Cleveland, which consists of accessories and supplies of all kinds.

Washington, D. C.—The Regal agency has been transferred from the A. Loffer Co. to the Probey Co. The latter also handles the Michigan. F. C. Sibbald has resigned as sales manager of the Probey Co. and has been succeeded by W. D. Arrison.

New York—The Kolb Sales Co., with offices in the United States Rubber building, has recently been organized to represent the interests of different accessory and specialty manufacturers in the eastern territory. Milton B. Kolb is at the head of the new organization.

Indianapolis, Ind.—F. E. Wilson, who has recently been associated with the Tone Car Corp., of Indianapolis, has severed that connection and joined the sales organization of the Marathon Motor Works of Nashville, Tennessee. Mr. Wilson will make his headquarters at Dallas, Texas, and have jurisdiction over the Marathon sales in five states.

STROMBERG

Carburetors

The Stromberg carburetor, besides producing a mixture that is scientifically correct for any climate — neither too "rich" nor too "lean" — utilizes every drop of gasoline.

This important economy is effected by the improved design of the extended venturi, the funnel-shaped metal projection which surrounds the gasoline nozzle and forms a mixing chamber for fuel and air.

The Stromberg extended venturi reaches to within a very short distance of the throttle opening. Only enough space is left for the ingress of the auxiliary air supply. In the ordinary carburetor the extended venturi does not reach so near the throttle opening, and as a result

the velocity of the mixed air and gas slackens in its course through the chamber.

In the Stromberg the incoming auxiliary air whirls about outside the walls of the extended venturi. When it reaches the top it helps "boost" the regular air and does not retard or "buck" it. The result is a thoroughly mixed compound of gasoline and air, shot directly through the throttle opening into the manifold and motor.

So strong is the force which drives the mixture into the throttle opening and so thor-

oughly are the fuel and air mixed, that none of the gasoline can precipitate. Every modicum is used for generating power.

This arrangement is so perfect that the Stromberg will throttle down to the lowest speed, on high gear—and still not waste one drop of gasoline.

Send your name and address for our "Reason Why Talks." They explain many other exclusive Stromberg features in detail. We will mail them, free and postpaid. Write today.

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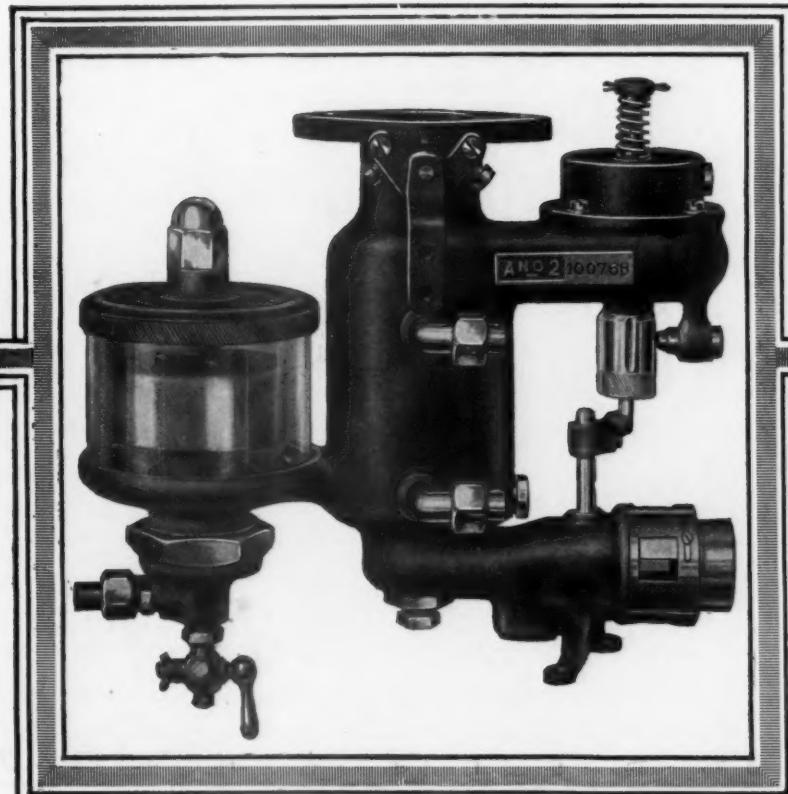
Branches

Detroit

Indianapolis

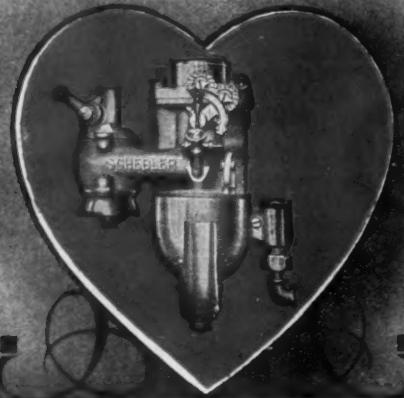
Minneapolis

Pacific Coast Distributors: Chanslor & Lyon Co., Los Angeles, Portland, Fresno, Spokane, San Francisco, Seattle
Canadian Distributors: Russell Motor Car Company, Toronto, Montreal, Hamilton, Winnipeg, Calgary, Vancouver



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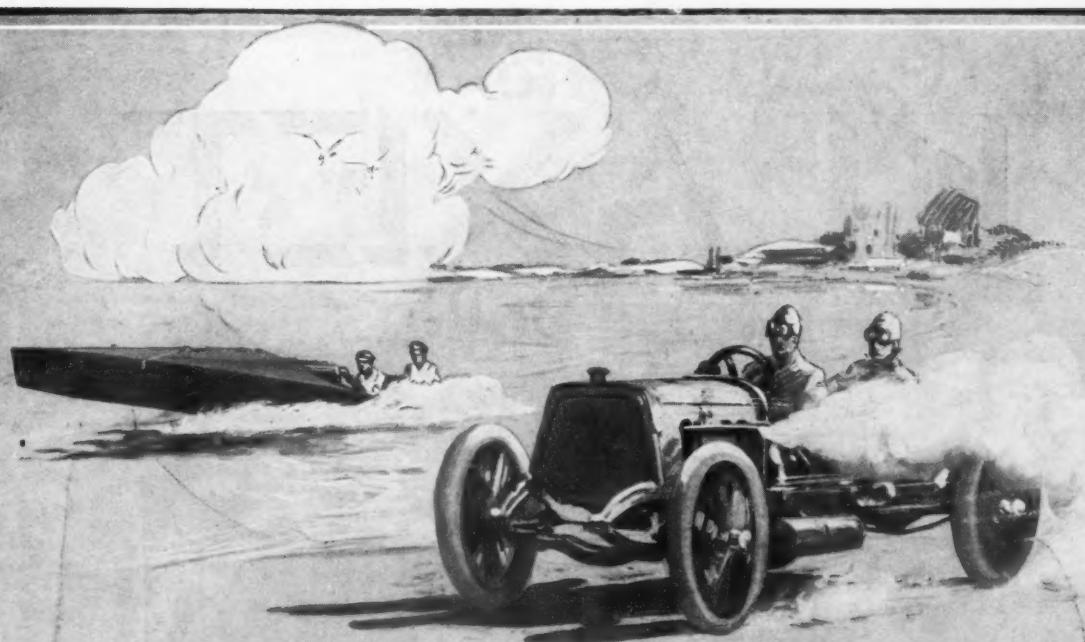
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"The Public Safety Signal"



KLAXON



Polarine

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For Any Kind of Motor
In Any Kind of Car or Boat

An oil that's right is right in **every** type of motor, whether in a pleasure car, a motor truck or motor boat. The universal oil is Polarine—used everywhere, and sold at cross-roads stations. Users never need go far without it.

Maintains the correct lubricating body at any motor speed or heat, and flows perfectly at zero. Penetrates to the remotest parts of the motor, protecting every friction point.

Cars run for years without depreciation when Polarine is used. **It's the best insurance you can buy**, and costs the least.

The World's Oil Specialists make it after 50 years' experience with every kind of lubricating problem and a study of all makes of motors produced. **Polarine** is the right oil.

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*Makers of Special Lubricating Oils for Leading
Engineering and Industrial Works of the World*

(112)



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You
Ever
Crank
and
Crank
and
Crank
?

And then cuss your stupidity when you discovered you had not turned your spark on? Sure you have—so have I—so has everyone who ever drove a gasoline car. With an

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You can't forget—your spark goes on automatically when you push the button. It's all there—waiting for you—just touch the button and be on your way—always sure—always ready—in fair weather or foul—warm or cold—absolutely reliable, if an



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YOU don't want to drive at night with uncertain gas and oil lamps. Those days are over, and you're glad they're over.

You're glad that you won't have any more experiences on lonely country roads when your oil lamps or gas lights go out; or you try to relight them in the wind with your very last match.

Those days are over for good, and the Aplco Electric Lighting System is your newer and better way.

Get the Aplco Electric Lights now

You can have this splendid perfected system installed in your car and really enjoy the coming season. It makes no difference whether you are using the old style gas lamps, or whether you have electric lights supplied by a storage battery; the complete Aplco System can be built in as if it belonged there.

The details of the Aplco System cannot be properly presented here. Its advantages are many, its reliability is unquestioned; you should write at once for complete information. You must always remember that Vincent G. Apple perfected the first electric lighting system for an automobile in 1907; he has been developing his system for six years; now it is perfection.

"Write us for special circulars about the Aplco lighting system"

The Apple Electric Company
67 Canal St., Dayton, Ohio

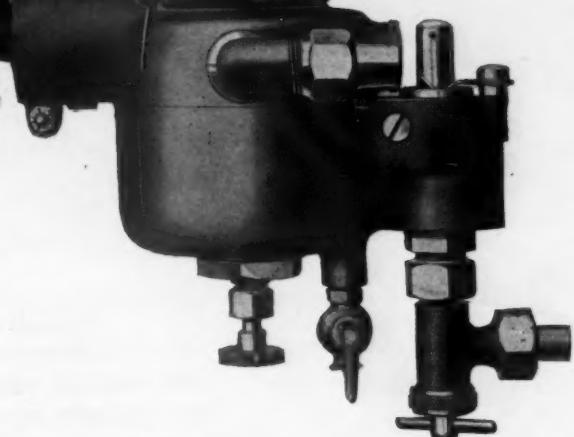
HOLLEY

CARBURETOR



NO MOVING PARTS

ONLY ONE ADJUSTMENT



The Growing Popularity

of the new self-adjusting Holley, the carburetor with no-moving-parts and only one adjustment, has resulted in a condition which, while fortunate from our standpoint, has made it impossible for us to take care of all the new business offered to us.

We have made, and are still making, additions to our factory and equipment, in order to take care of the increased business.

Our entire 1913 output is sold, and we cannot take any further orders for this year's output.

In 1914, however, we have made arrangements to handle the increased volume of our business promptly, and to that end are making advanced plans.

Our 1914 models are now ready for demonstration. We will send you one whenever you say you want it.

HOLLEY BROTHERS CO., 131-141 Rowena St., Detroit

AUTOMOBILE SUPPLY CO. 2335 Michigan Boulevard, Chicago, Ill. OMAHA RUBBER CO. Omaha, Neb.

FOREIGN BRANCH: Holley Bros. Co., Coventry, England

Holley Carburetors are carried in stock at the following addresses: CHAS. E. MILLER, Home Office: 97-108 Reade St. and 121 Chambers St., New York

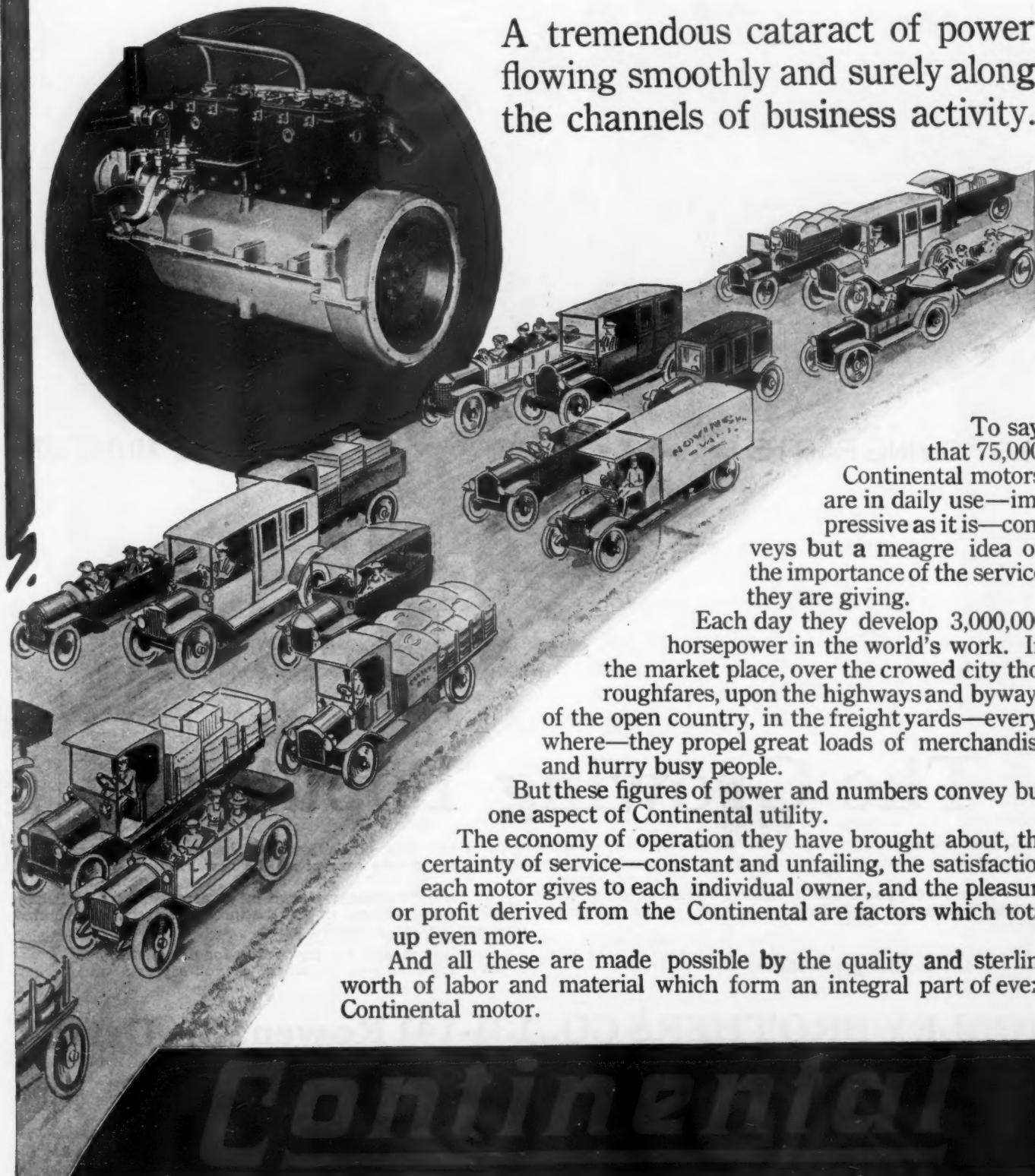
BRANCHES:

New York City.....	924 Eighth Ave. Between 54th and 55th Sts.	Hartford, Conn.....	274 Trumbull St.	Detroit, Mich.....	227-229 Jefferson Ave.
New York City.....	2782 Broadway Between 107th and 108th Sts.	Atlanta, Ga.....	66 Edgewood Ave.	Cleveland, Ohio.....	1829 Euclid Ave.
Springfield, Mass.....	Bridge and Dwight Sts.	Brooklyn, N. Y.....	1421 Bedford Ave.	Philadelphia, Pa.....	818 North Broad St.
		Buffalo, N. Y.....	824 Main St.	New Orleans, La.....	601-6-3 Baronne St.
		Albany, N. Y.....	135 Central Ave.	Newark, N. J.....	274 Halsey St.
		Boston, Mass.....	202-204 Columbus Ave.		

When Writing to Advertisers, Please Mention Motor Age.

Continental Motors

**A 3,000,000 H. P. factor
in doing the world's work**



A tremendous cataract of power flowing smoothly and surely along the channels of business activity.

To say that 75,000 Continental motors are in daily use—impressive as it is—conveys but a meagre idea of the importance of the service they are giving.

Each day they develop 3,000,000 horsepower in the world's work. In the market place, over the crowded city thoroughfares, upon the highways and byways of the open country, in the freight yards—everywhere—they propel great loads of merchandise and hurry busy people.

But these figures of power and numbers convey but one aspect of Continental utility.

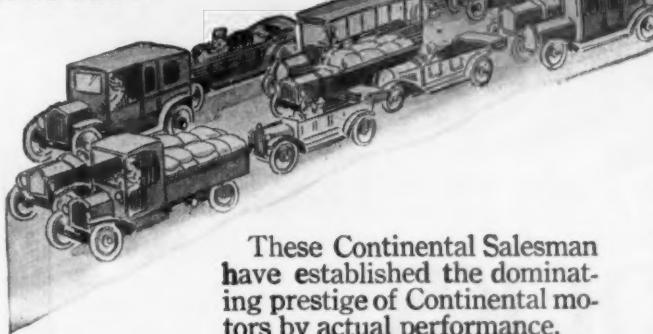
The economy of operation they have brought about, the certainty of service—constant and unfailing, the satisfaction each motor gives to each individual owner, and the pleasure or profit derived from the Continental are factors which total up even more.

And all these are made possible by the quality and sterling worth of labor and material which form an integral part of every Continental motor.

Continental

75,000 Continental Salesmen

are on the road every day—delivering powerful arguments and driving home the Continental gospel of Quality and Service.



These Continental Salesmen have established the dominating prestige of Continental motors by actual performance.

They have made good by their *work* and have built up their reputation through ten years of constant service.

That is what safeguards the manufacturer who uses Continental motors, what makes the sale easy for the dealer who handles cars so equipped, what impels the buyer to call for the car with this famous motor in its chassis.

The Reason of Continental Quality

Continental quality is a living, tangible, dominating thing.

Placed in a chassis this motor guarantees the rest of the car—it carries the prestige of high quality into every other part. It is sales insurance.

Such prestige is not accident—or luck.

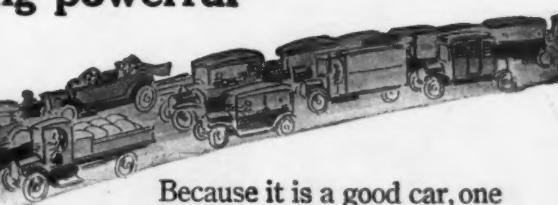
It is the result of the most conscientious and scrupulous manufacturing methods.

An efficient organization, two mammoth factories—the largest in the world making motors exclusively, an equipment that is exhaustive and complete, together with the accumulated experience of a hundred engineers with whom we are in constant touch make Continental Quality possible.

A Builder of Reputation

Continental motors have built up more motor car reputations of merit than any other single factor.

Wherever you see a car using Continental power you will hear that car praised.



Because it is a good car, one built up to the Continental standard—the highest in the motor industry, or it could not buy a Continental power plant.

And it must maintain this high standard.

The prestige of the name Continental markets it and sells it.

Manufacturers who use this motor do so because it pays.

They do not have to "sell" it to the dealer and then to the public.

It is already "sold" to the prospect before it enters the chassis. It builds sales.

The Value of Assembled Cars

Hold up one hand and you can count on the fingers with some to spare the automobile companies big enough to successfully compete with the specialist.

The enormous outlay of capital, the accumulated experience, the great factory space necessary are far beyond the reach of 99% of motor car manufacturers.

The specialist concentrates on one problem, he throws all his energy and resources into making one thing well.

He makes a better article for less money and lowers the cost of manufacture.

Continental motors are dominating the motor field through *Quality*, making possible bigger outputs and dividends and are placing the well assembled car where it rightfully belongs—the first choice of careful buyers.

Continental Motor Manufacturing Co., Detroit, Mich.

Factories, Detroit and Muskegon, Michigan





INTERLOCKS

Double Your Tire Mileage

Prevent Punctures and Blow-Outs—Save Half Your Tire Expense

The Interlock Inner Tire is the only reinforcement that prevents rim cutting or that can be used to hold rim cut tires. Interlocks reinforce the sides of the tires as well as the tread, because they completely enclose the tube, and the interlocking flaps lock to the rim under pressure, giving ample excess fabric strength both to sides and tread.

tests have proved the efficiency of Interlock Inner Tires beyond question.

What Interlocks Are

Interlock Inner Tires are complete endless inner tires (not inner shoes) quickly and easily placed between the outer casing and the inner tube. They strengthen the outer case and protect the inner tube from punctures. The patented Interlock Flaps lock the Interlock securely, making it an integral part of the whole tire that flexes perfectly, and cannot chafe, creep or heat. Interlock Inner Tires will hold even if the outer case is broken, and can be used in old or new tires. They double the mileage of new tires and add 1,000 to 5,000 extra miles to old ones. Interlocks have a fine gray rubber finish, are smooth outside and inside and have no troublesome ends, joints or edges to cement. Interlocks do not affect the resilience of your tires—are easy to insert and can easily be removed from one tire and placed in another.

Write for Our Booklet Today

Read the testimonials of enthusiastic users. Let us give you complete information about Interlocks and the official records of hard road tests. Read what the world's largest tire manufacturers say about them. It will pay you to investigate.

To Dealers and Agents We want a live, reliable dealer in every city. You can do a big business by simply explaining Interlocks to car owners. Every car owner wants a set when he understands what they do. We give positive selling assistance and are advertising Interlocks widely.

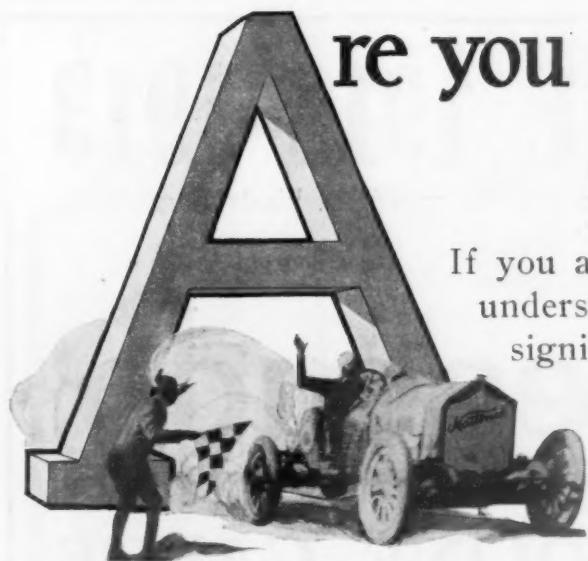
Interlocks are Carried in All Sizes by:

Beckley-Ralston Co., Chicago; Motor & Machinists Co., Kansas City; Bi-Motor Equipment Co., Boston; Fry & McGill Co., Denver; Western Auto Specialty Co., Iowa City, Ia.; Gibson Automobile Co., Indianapolis; Southern Wesco Supply Co., Birmingham, Alabama, and all leading jobbers of automobile supplies. Please give the name of your supply jobber when you write.

DOUBLE FABRIC TIRE CO.
128 West 9th Street - Auburn, Ind.



When Writing to Advertisers, Please Mention Motor Age.



Why the National Continues to be the World's Champion Car

We want you to "get" this, it is worth knowing. The National car is still the World's Stock Championship car.

When the contest was held at Elgin for stock cars only (absolutely the kind sold), the National won. Average, 66.4 miles per hour—entire race of 305.03 miles run without a tire change. That is the demonstrated proof that the National stock cars are superior—and many of the cars defeated by the National cost you thousands of dollars more.

The National also holds the world's record for the fastest straightaway mile for a stock car. Time, 40.32 seconds. Average, 89.28 miles per hour.

Now comes the application of this knowledge to yourself.

You do not want to race. No. But you do want these things—a car with reliability; a car with honest value, and a car built and backed by reputable manufacturers.

The National stock championship guarantees all of these to you and more. It is your positive, dependable proof of the greatest value that is built—and our prices are very modest compared to cars that have failed to show the same stamina, power, speed, reliability and serviceableness as the National.

If you want to own, and sit behind the wheel of the car that is the Stock Champion today, you must come to us. The National still rests at the pinnacle of motor car achievements. And the National that won the 500-mile race last year (a non-stock race then as it is now) was made almost entirely of stock parts. Thousands of people, amply able to pay any price, now see the superior service, comfort and enjoyment to be had with the moderate-priced National. It is the world's champion car—the world's finest piece of mechanical construction, and the champion no matter where you drive it nor under what conditions. It never fails—it is yours to command and rest confident in its conquering powers.

Electric Started. Electric Lighted. Left-side Drive. Center Control

Five Models, \$2750 to \$3400

Are you going to see the race?

500 Mile - May 30
Indianapolis Motor Speedway

If you are, you want to be well posted—you want to understand just what is happening, and appreciate the significance of the speed performance as it takes place.

We have made an analysis of last year's race—the record that is hung up for this year's contest to go after. We give you the "dope" or the "box score" as it were, that will help you better enjoy and make comparisons.

It Is Absolutely Free To You

Just sign the coupon below and mail to us at once—and even if you won't be at the race it will be a pleasure for you to have this valuable information for comparisons as you get the reports from the contest at home. Last year's five hundred mile race was the greatest contest in history, and of course you want to be well posted. It is not enough just to know the winning time, get all the interesting detailed information that we will be glad to send you without any obligation upon your part. Last year's race was won—and a new record established—by the

Stock Champion **National** International Champion

This car is built in Indianapolis. It would be wise for you to come to Indianapolis a day or two before the race and visit the National factories. Just let us know when to expect you and we will meet you at the train.

**National Motor
Vehicle Co.**

Indianapolis

When Writing to Advertisers, Please Mention Motor Age.

NATIONAL MOTOR VEHICLE COMPANY, Indianapolis.
Please send me at once without obligation upon my part your story of the
500-mile race.
Name.....
Address.....
I am a dealer.....
I am a private owner.....

OWNERS OF THE 1912-1913

Ford, Overland, Buick, E. M. F. and 1913 Studebaker will be saved all kinds of gasoline troubles by installing



THE *Dependo* GASOLINE GAUGE

(ATTACHES TO THE DASH)

\$7.50

BRASS OR NICKEL FINISH

Accurate and dependable under all conditions.

No more dry tanks miles from garage; no more pulling up cushions to use measuring stick. Detects leaky tanks at once. Shows instantly amount of gasoline that goes into tank and amount consumed per mile.

One week's use will prove it a necessity. Full instructions sent for installing.

When ordering state make, model and year of your car.

If for cars not mentioned in this ad, send us name, model and year and we will notify you if we can supply you at once. Not made at present for cars having pressure tanks.

If your dealer cannot supply you, we will direct, on receipt of price.

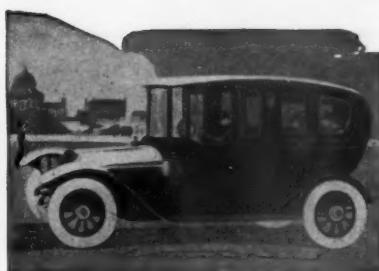
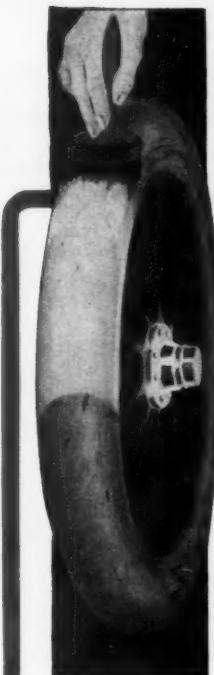
Send for catalog No. 8, giving full particulars

A WORD TO DEALERS

The Dependdo Gasoline Gauge is the first and only dependable one ever invented. Yet you know the demand for a gauge of the character of The Dependdo has been and IS insistent. Our campaign of national advertising which starts March 1, will surely augment that demand and show how The Dependdo will surely fill that demand to the letter.

You will have many calls for The Dependdo. Why not stock The Dependdo at once and thus be able to fill orders promptly. Our proposition to dealers means dollars to you. Write us today for full particulars and catalog.

C. F. ROPER & CO., HOPEDALE, MASS.



Tire Trimness

Trim, new looking tires make the whole car more smart and attractive.

A weekly coat of Tirenew makes tires look like new and protects them from decay, caused by light, air, oil and moisture. Adds 30 per cent to tire life.

TRADE MARK
TIRE NEW



Prevents Tire Decay

A liquid, unvulcanized rubber compound with a base of pure rubber. Puts a protecting waterproof coat on outer surface of tire and all fabric exposed through cuts or cracks.

Will not rub or wash off.

Most garages include Tirenewing in their weekly caretaking service, or you can easily apply it yourself. Your dealer keeps it.



There are imitations which paint but don't protect—insist on

TIRE NEW

DEALERS

—Earn Narco Profits Now

You can't begin too soon. There is a big demand for these products based on our advertising and on their actual merit and usefulness—therefore, it's a lasting demand. You can depend on it. If you haven't yet stocked them, find out about them at once for profit and satisfaction of a satisfied trade—Narco Tire Cut Filler, Tirenew and the rest of the Narco line. Write to-day.

NATIONAL RUBBER COMPANY, 4411 Papin Street, St. Louis, Mo.

When Writing to Advertisers, Please Mention Motor Age.

Tire Security

Start out right—tires safe and sound—no cracks and holes where sand and stones can creep in between rubber and fabric, causing sand blisters and eventually blow-outs.

Even if the tires are not new you can make them secure with



**NARCO
TIRE CUT
FILLER**

Heals Tire Cuts

A non-inflammable, self-vulcanizing compound, heavy in rubber. Fills cuts and holes and unites torn parts of the tire with a permanent plug of rubber as resilient as the surrounding tread.

In convenient, collapsible tubes with long tapering spout. Easy to use—heals over night and becomes like a part of the tire.

Your dealer will supply you. Large tube, \$1.00. In Canada \$1.50.



National Rubber Co., 4411 Papin Street, St. Louis.

Gentlemen:—Enclosed find \$1.00 for which please send me prepaid a large tube of **NARCO TIRE CUT FILLER**.

Also please send me information regarding Tirenew and your other Narco Products.

Dealer's name _____

Jobber's name _____

Address _____

My name _____

Address _____

Address _____

Letters From Stearns-Knight Owners

(No. 29)

**"Finest six-cylinder poppet-valve
motors cannot equal your 'four'"**

" * * I consider the Stearns-Knight the greatest motor ever built. I have experienced the finest six-cylinder poppet-valve motors but they cannot equal your 'four' in any way.

"The lubrication, ignition and carburetion are perfect. It is most flexible, wonderfully smooth and silent, and constantly gaining in power."

(Name Furnished Upon Request)

Stearns
THE ULTIMATE CAR
(KNIGHT TYPE MOTOR)

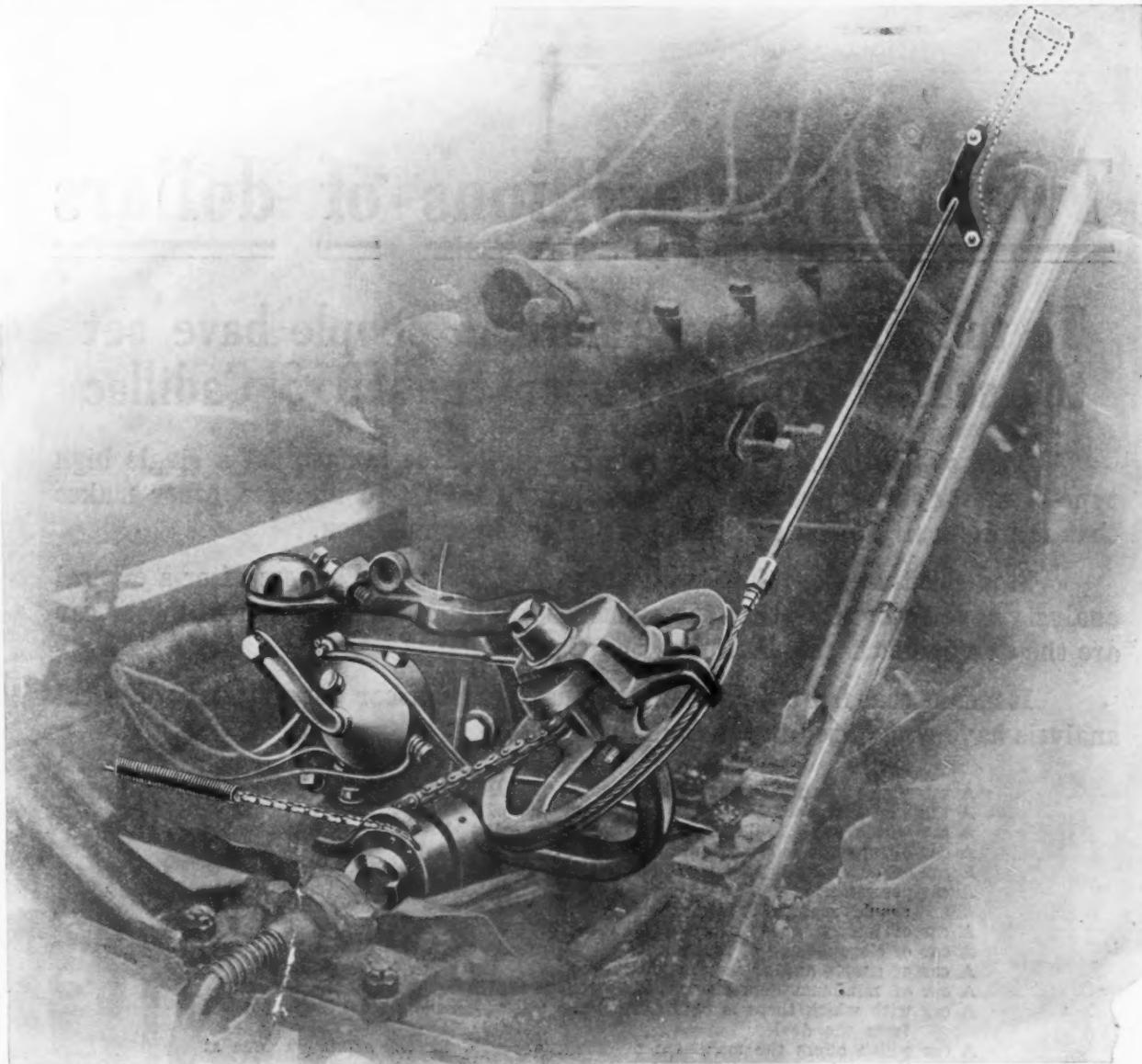
The F. B. Stearns Company
Cleveland, Ohio

Branches and Dealers in 125 Cities

Announcement

BOSTON STARTER

AN INNOVATION FOR FORD CARS
ONE PULL of the Hand CRANKS the CAR FROM THE SEAT



BOSTON STARTER on FORD Model T with FAN and Radiator Removed

FORD DEALERS

*Send for descriptive circular—Just off the press.
Our special dealers' proposition will interest YOU*

Automatic Appliance Company

172 Columbus Avenue
Western Office: 803 Citizens Bldg.

Boston, Massachusetts
CLEVELAND, OHIO

When Writing to Advertisers, Please Mention Motor Age.



Twenty-five millions of dollars

To this extent the American people have set the seal of approval upon the 1913 Cadillac

This evinces such an overwhelming preference in favor of a single high type of motor car as against any one of more than two hundred other makes that it practically obviates the opportunity for comparison.

It means that more than twelve thousand motor car buyers after a critical analysis have recognized that the elements vitally essential to a real motor car are the dominant characteristics of the Cadillac.

It means that more than twelve thousand motor car buyers after a critical analysis have recognized in the Cadillac:—

- A car that is manufactured and not merely an assembly of components.
- A car whose maker is one of reputation and of stability.
- A car whose parts are thoroughly standardized and thoroughly interchangeable.
- A car of unsurpassed mechanical accuracy.
- A car of dependability and of durability.
- A car possessing a factor of safety so liberal that it withstands far more than should reasonably be expected of any car.
- A car of luxury, a car of comfort, a car of convenience.
- A car of elegance and of refinement.
- A car of simple and of easy operation.
- A car of minimum depreciation and of maximum value as a used product.
- A car with which there is obtainable a real "service," both from the maker and from the dealer.
- A car which offers the maximum of efficient service for the maximum time at the minimum cost.
- A car which is "different" and which by reason of the "differences" commands a position uniquely its own.
- A car whose merit is not confined to one or a limited few "talking points," but rather a car of super-excellence in its entirety.
- A car which will uphold in abundant measure the wisdom of those who have honored it with their seals of approval.
- A car whose distinctive characteristics are obtainable only in the Cadillac itself.

STYLES AND PRICES

Standard Touring Car, five passenger.....	\$1975.00	Coupe, four passenger.....	\$2500.00
Six passenger car.....	\$2075.00	Torpedo, four passenger.....	\$1975.00
Phaeton, four passenger.....	1975.00	Roadster, two passenger.....	1975.00

All prices are F. O. B. Detroit, including top, windshield, demountable rims and full equipment.

Cadillac Motor Car Co. Detroit, Mich.

*in Favor
of the*

BETHLEHEM
FIVE POINT
SPARK PLUG

Will Not Carbonize

Economizes Fuel Consumption

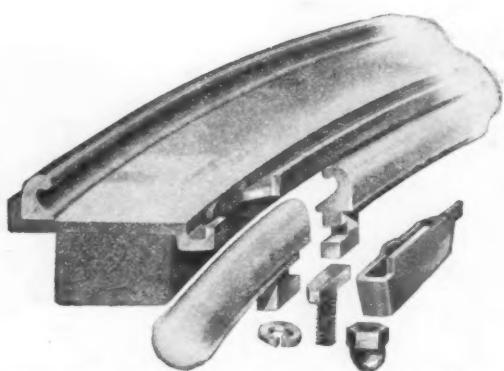
Made of Best Materials Obtainable

Gives More Power to the Motor

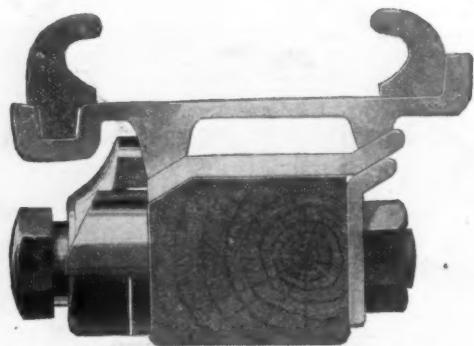
Guaranteed for the Life of the Car

ILLUSTRATED BOOKLET SENT ON REQUEST
PRICE \$1.25 AT ALL DEALERS—OR BY MAIL

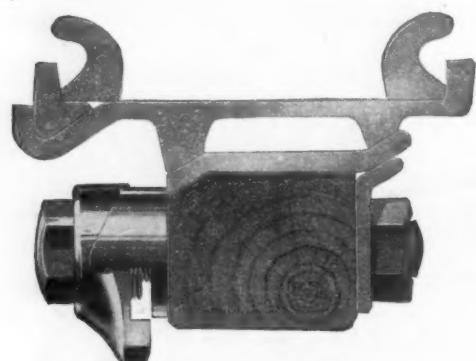
THE SILVEX COMPANY
SIXTY WALL STREET
NEW YORK



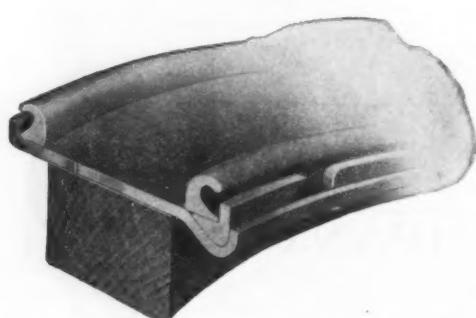
Standard Universal Quick Detachable No. 1



Standard Universal Quick Detachable Demountable No. 1



Standard Universal Quick Detachable Demountable No. 2



Standard Universal Quick Detachable No. 2

Announcement

TO those motorists and car manufacturers who may have need of

Spare Parts

for

Standard Universal Rims

Manufactured under License Granted by

**The United Rim Co.
Akron, Ohio**

We shall be able for a certain period of time to furnish such parts for the following types:

Standard Universal Quick Detachable No. 1 and No. 2

Standard Universal Q. D. Demountable

**No. 1, No. 2 and No. 3
(Gilbert-Continental)**

These rims are known under several different names, and the design of some of the styles has been changed several times.

Therefore—

When writing, it is advisable to give as much information as possible concerning the type of rim for which extra or spare parts are desired.

To aid the purchaser, a few of the rims are shown on this page.

For further information, write to

**The Standard Welding
Company CLEVELAND**

Offices in
New York Chicago Detroit

The new "thumb" method OF SHIFTING GEARS

The Driver Now Selects Any Speed by Mere Movement of Thumb Gear Control on Steering Wheel

After two years of severest factory and road tests, we announce the *Gray Pneumatic Gear-Shift*—the first and only mechanism of its type in existence.



Note the Absence of Levers

This ingenious invention forever abolishes gear levers. It places the gear control on the steering wheel—right under the driver's thumb.

It enables *anybody*—man, woman or child—to handle a gasoline car with utter safety. The machine is operated without the driver moving his body, without even taking his eyes off the road!

And the beauty of it is, the "Gray Pneumatic" can be put on ANY car by ANY garage man. You don't have to buy a NEW car to utilize this equipment.

Another Advantage

You may be ascending a hill at high speed and at the same time indicate "second." The moment you hit the steep incline you go into "second" like a flash by depressing your clutch pedal.

Or, on a busy street when the advance signal is given, a quick depression of clutch pedal engages first speed. The next moment you are indicating "second," and you take it when you depress clutch pedal again. *Selection of the various gears is accomplished just as fast as the clutch pedal can be pressed down and released.*

The emergency brake is attached to the service brake pedal, which is locked whenever desired. Thus the brake lever as well as gear lever is discarded.

Removal of air-valve handle locks car, absolutely preventing theft.

Some Tests

Two hundred expert drivers to date have operated the "Gray Pneumatic," and unqualifiedly approve it.

One car, carrying Gray Pneumatic equipment, was driven 25,000 miles without repair of gear-shift. Being used for demonstration purposes, the gears on this particular car have been

shifted ten to twenty times as often as you will ever shift your gears.

Nine big automobile makers recently witnessed its successful performance. As a result, the Gray Pneumatic Gear-Shift will be found on thousands of 1914 cars.

Also a Self-Starter

While we term it a Pneumatic Gear-Shift, this is a *self-starter*, too—a dependable self-starter—the only successful one we know which can be applied to a *completed car*. The starter is the popular "high-speed" type, the kind that revolves the motor rapidly and insures a quick, sure start. Operated by a push button.

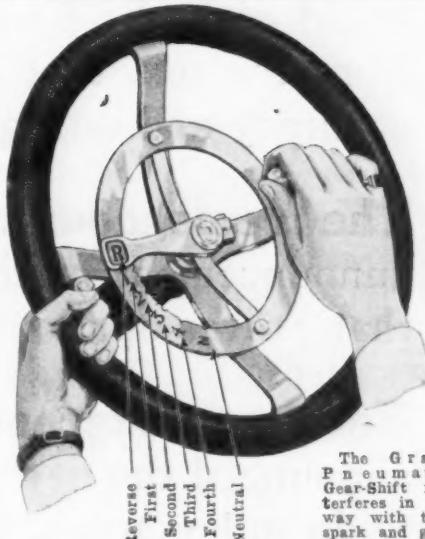
With this pneumatic equipment one can shift gears, start the car, jack up the car, clean the car, inflate tires and lock the car.

Get Our Illustrated Catalog

Tell us what car you drive, or are about to buy, and we will write YOU a detailed explanation of the Gray Pneumatic Gear-Shift, quote you prices and tell you how you can have this wonderful equipment on your car.

Send your communication by letter, postal or coupon at right. If you write today you'll get a reply by return mail. Address

The GRAY Pneumatic Gear-Shift



The Gray Pneumatic Gear-Shift interferes in no way with the spark and gas throttle.

How It Works

First: The indicator on the wheel is set for "first speed." The actual accomplishment is obtained in one full stroke of clutch pedal. An analysis of the operation performed by a single stroke shows—

(a) The usual disengagement of the clutch. (b) The automatic application of the usual means for stopping the revolution of the transmission shaft. (c) The automatic movement of all gears to neutral position immediately upon the stoppage of the transmission shaft. (d) The opening of the valve to allow the air pressure to force the selected gear into engagement. The return stroke of the pedal accomplishes the usual engagement of the clutch and starts car.

Second: The indicator on the steering wheel is then placed for "second speed," and the clutch pedal depressed, whereupon the same operations take place as indicated for first speed.

Third: While in second speed indicate third speed, and again make a complete stroke with clutch pedal. The four speed control can be had if wanted.

To obviate the danger of selecting the reverse position when the car is moving forward, a lock latch is provided for the indicator, which must be opened before it can be moved to reverse position.

Before passing from one speed to another, the gears assume neutral position.

This Brings Illustrated Book

RESEARCH COMPANY

Dept. F—122 S. Michigan Ave., Chicago

Gentlemen: Please send me your illustrated book and full information.

Name _____

Address _____

Do you own a car, or are you getting ready to buy one?

Research Company
Dept. F—122 S. Michigan Avenue, Chicago
Factory—Plano, Ill.

(2)

Very Nicely—Thank You!

The recent announcement of the new Maxwell "25" at \$725 has brought the usual response—dealers are tumbling over each other to get the line.

We have always maintained that the average dealer could pick the live one from the dead—the sure-comer from the one that is on the going line—with absolute accuracy and on sight.

The tremendous results that have followed the simple announcement of the Maxwell "25" is only another case that proves our contention.

Here's an interesting angle: We have never publicly announced the new Maxwell "35" Model. Had planned to do so last week, following the "25".

We don't need to now for dealers are clamoring for that model too, and we're signing up for the full line—the beautiful, silent "50-6" included of course—as fast as we can look the dealers over and pick the live ones from among the hundreds of applicants.

Are you in the line yet?—better get in then for there won't be enough to go around.



MAXWELL MOTOR COMPANY
EXECUTIVE AND SALES OFFICES
DETROIT, MICHIGAN



TAYLOR "NOIL" TIRE PUMP

Install the TAYLOR on your engine. Turn a lever and—behold!—your tires are filled.

Filled with good, clean air, too—air absolutely free from Oil and Oily vapors. Tires maintained at correct pressure. Only four minutes required to fill.

The Oil-less Tire Pump

Most other tire pumps discharge oil and vapor into tires. The construction of the TAYLOR "NOIL" is such that it cannot.

Simple in principle, simple in installation, simple in use,—it has no complicated parts to get out of order.

Saves \$60 to \$120 a Year

Tires kept at low pressure soon wear out. And it is a physical impossibility to inflate a tire to the required degree by hand.

The TAYLOR "NOIL" TIRE PUMP soon saves its small cost in reduced tire bills alone. Some owners claim it saves them \$120 per annum.

The price of the Taylor "Noil" Tire Pump is \$30, which includes necessary brackets, gears, hose and pressure gauge complete. Drop a postal for full information and name of nearest dealer.

Dealers Wanted!

Here is a virgin field for garage men and motor-car dealers. Write today and secure full particulars. Get the agency. It is important that you act QUICK.

Taylor Mfg. Co.

P. O. Box 485 E
Chicago, Illinois



Stop! Let Your Engine Do the Work!

This laborious hand-pumping of tires must now speedily end.

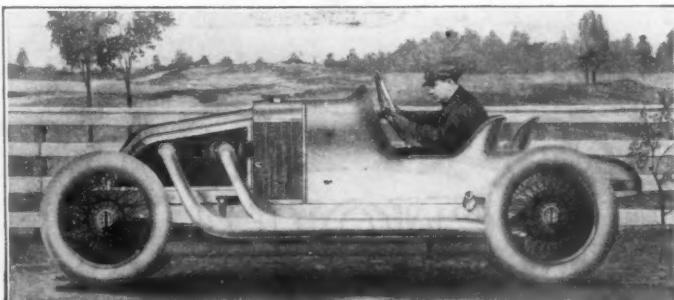
For science has perfected a simple little engine-driven Tire Pump that is the very acme of efficiency. Its small cost is within reach of the most modest car-owner. And this invaluable labor-saver is a money-saver, as well. It prolongs the life of tires by almost half.

THE TAYLOR "NOIL"—

A Never-Failing, Engine-Driven
No-Oil, Fool-Proof Tire Pump

is putting the hand pump out of business. Owners, everywhere, are installing it. And leading manufacturers are including it as regular or special equipment on 1914 cars.

Packard, Hudson, Cole, Oakland, Case, Abbott-Detroit, Overland, Reo and many others indorse the Taylor and install it as extra equipment on any of their models, at their factories or their branches.



Bob Burman in his Keeton Racer

We put the Keeton through all the stunts we could think of—and couldn't find a hole in it anywhere. I can only say that anyone who beats us will be "going some."

Bob Burman

Testing Trips Exceed Even Burman's Expectations

On rough roads and through the sand of Wayne County, over the hills and fine stretches of Oakland County—Burman tried out the Keeton Racer to find a weak spot. He returned from the trip more enthusiastic than ever over the wonderful possibilities of this car.

He put the car through tests that the average owner would never think of putting his car to.

The Keeton came through without a single fault. Just think what this great margin of safety means to the owner, when he knows that he can depend upon his car under all conditions.

On account of its distinctive appearance and sturdy mechanical construction the Six-48 Keeton is being eagerly sought by men who know the finer points in motor cars.

It will pay you to investigate.



"Six-48" Riverside Touring Car

Keeton Motor Company, 461 Lawton Avenue Detroit, Mich.
Keeton Motors, Ltd., Brantford, Canada

Attention, Automobile Dealers!

Sell This Car with *Your Own TradeMark* on the

Radiator



Why Not Go Into the Automobile Business?

With your own car, bearing your own name, and with your own trade-mark on the radiator? That's where the real money is in this business, and that's the real way to build up a business that no one can take away from you at a moment's notice.

Of course the Right Car is the important factor. Well, here it is, and we are prepared to enter into contract with you to deliver this wonderful car at a price that will amaze you.

People are better posted on the real points of superior motor car design and construction than they were several years ago. You have to show them a *real* car. And at a *really attractive* price. You can see for yourself how modern and complete this car is by a glance over the specifications in the adjoining column.

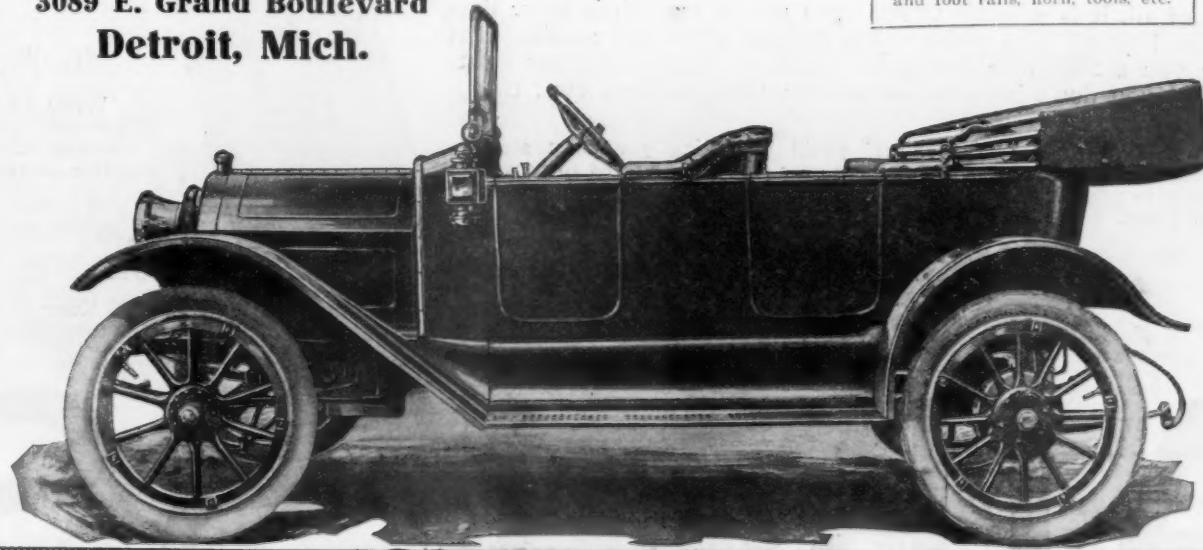
Immediate Delivery

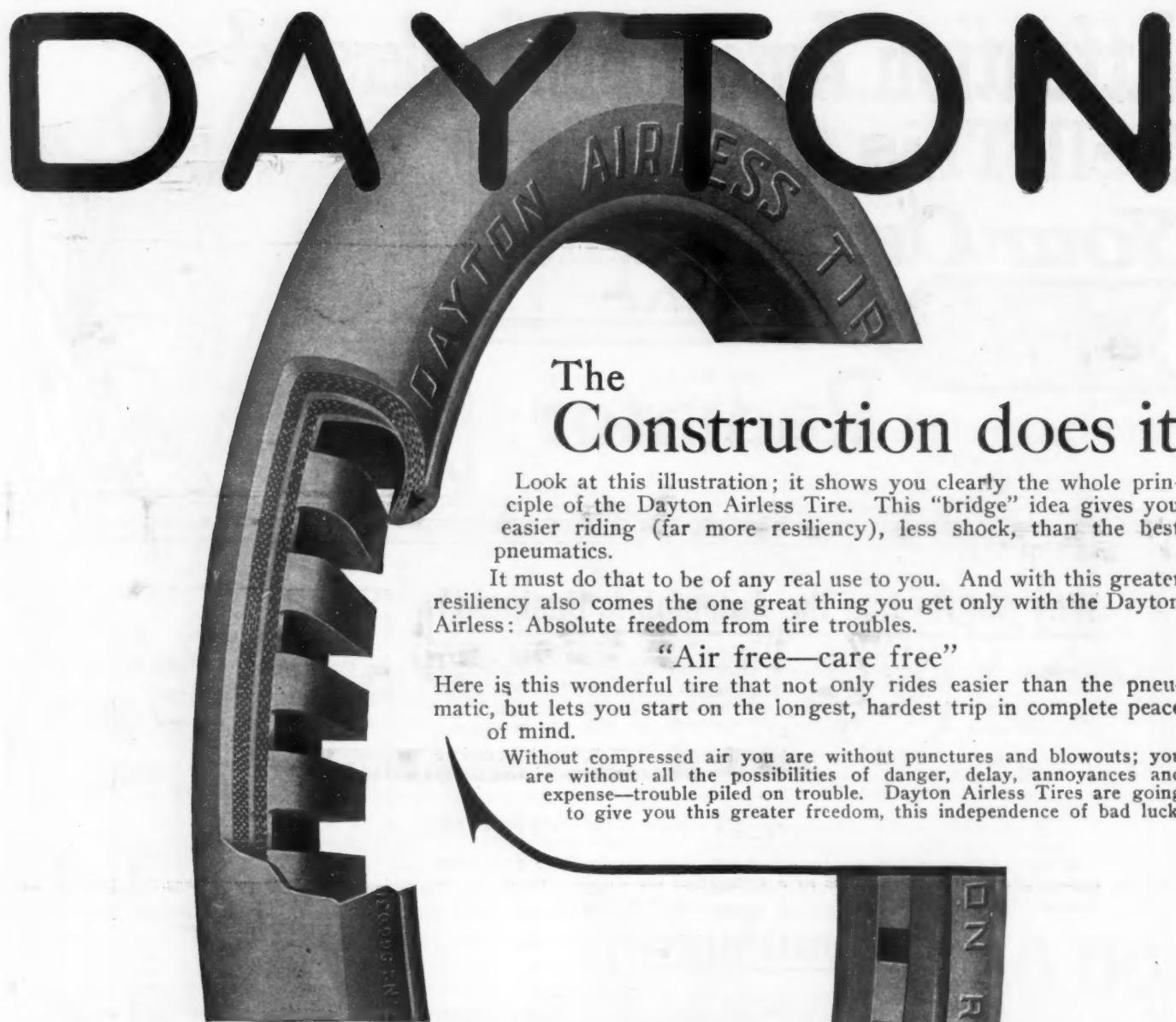
Write for our Full Proposition. We will tell you more about the car—more about the price and the profits—more about this big opportunity to build up a quick-paying, permanent automobile business for yourself. Write that letter today to

Wahl Motor Sales Company
3089 E. Grand Boulevard
Detroit, Mich.

Specifications

Motor—Four cylinder, 25 H. P.
Clutch—9 in. disc, Raybestos lined.
Transmission—Four speeds. Extra heavy.
Ignition—Bosch magneto.
Steering—Worm and gear, irreversible.
Rear Axle—Semi-floating.
Front Axle—I-beam.
Body—Two or five-passenger.
Gasoline Tank—15 gal. Oil, 1½ gal.
Control—Center control.
Color—Blue-black. Nickel trimmings.
Cooling—Thermo-syphon.
Lubrication—Constant level, force feed. Sight feed on dash.
Carburetor—Holley "H".
Brakes—10 in.
Wheels—Wheel Base, 108 inches. Wheels, artillery type demountable rims; tires, 32x3½ inches.
Springs—Front, semi-elliptic; rear, three-quarters elliptic.
Frame—Pressed steel.
Equipment—Mohair top, curtains, windshield, speedometer, dash carburetor adjustment, black enamel and nickel gas headlights, oil side and tall lamps, demountable rims, robe and foot rails, horn, tools, etc.





The Construction does it

Look at this illustration; it shows you clearly the whole principle of the Dayton Airless Tire. This "bridge" idea gives you easier riding (far more resiliency), less shock, than the best pneumatics.

It must do that to be of any real use to you. And with this greater resiliency also comes the one great thing you get only with the Dayton Airless: Absolute freedom from tire troubles.

"Air free—care free"

Here is this wonderful tire that not only rides easier than the pneumatic, but lets you start on the longest, hardest trip in complete peace of mind.

Without compressed air you are without punctures and blowouts; you are without all the possibilities of danger, delay, annoyances and expense—trouble piled on trouble. Dayton Airless Tires are going to give you this greater freedom, this independence of bad luck.

The Dayton Airless is the big step of this generation in tire making. It marks the longest advance of any part of the great sweep of progress in automobile manufacture. The development and final perfection of this tire means the end of their worst troubles to thousands of motorists.

Best of all, it is possible to sell it to you at very little more than the air-filled tires. This difference is nothing when you consider that we give you a 5000 mile guarantee (8000 on Ford and other light cars); that you don't have to carry extra tires, casings, etc.; that expense is over.

If you will send for our "Catechism" you'll be taking your first step towards the best motoring season you have ever enjoyed. Ask us to prove these things to you; it's better than getting misinformation from people who don't know.

To Agents

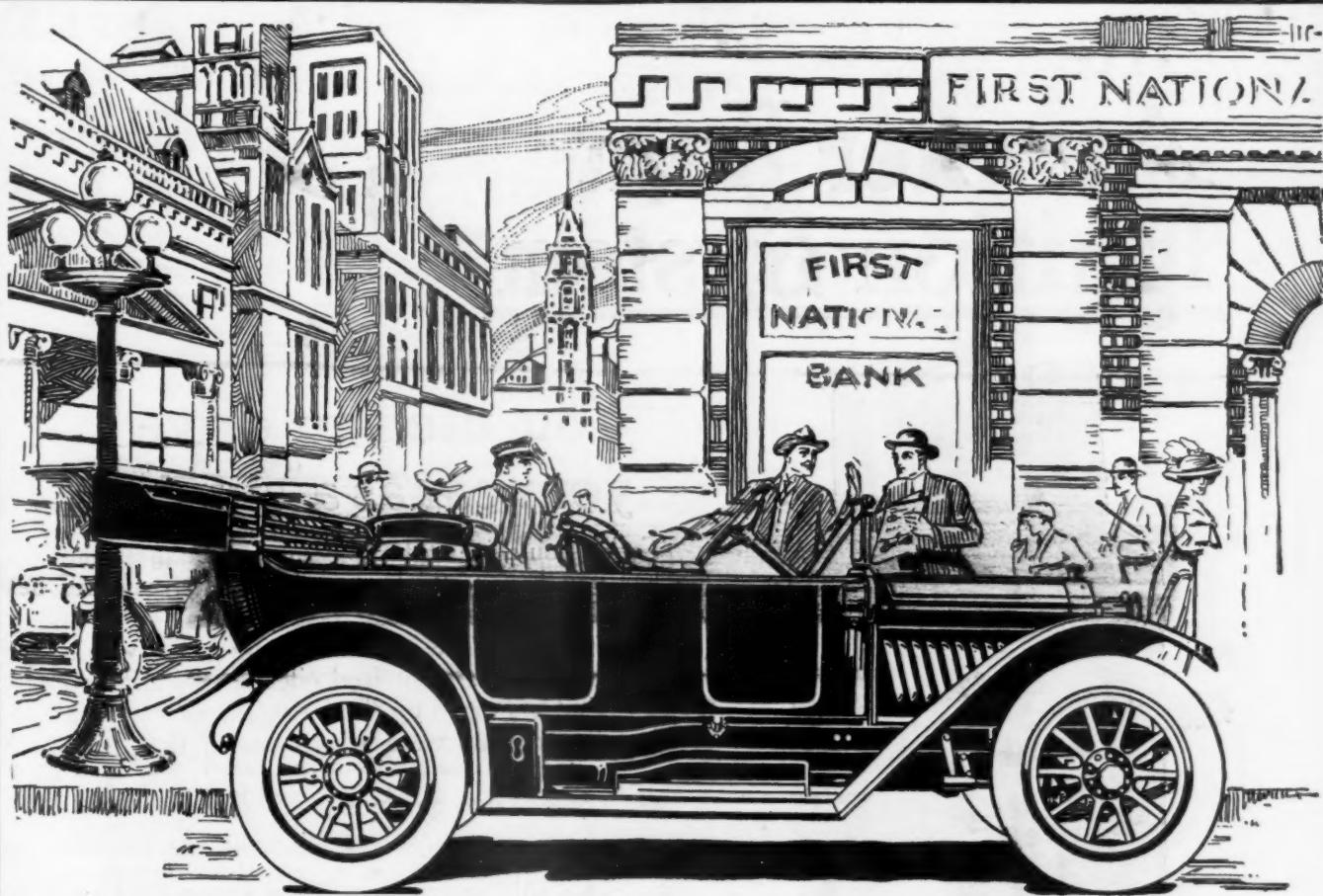
Write us about territory for this practical sure-selling line of tires.

Dayton
Rubber Mfg. Co.

1000 Kiser St.
Dayton, Ohio

AIRLESS

When Writing to Advertisers, Please Mention Motor Age.



"MY NEXT CAR WILL BE ANOTHER ABBOTT-DETROIT"

That is the unanimous declaration of the owners of America's favorite car. The majority of these motorists had previously owned cars before purchasing an Abbott-Detroit. They were well versed in automobiles and knew what they were about when they decided that their next car would be an Abbott-Detroit.

No such person has ever had occasion for regret in having made such a change. The Abbott-Detroit is found to be absolutely dependable and in every way a high-class car. It is the car tried and true.

But there is possibly a still greater and more important truth that will interest you. It is this: That once having joined our ranks, our owners always continue to buy Abbott-Detroits. Hundreds of financially able people who insist on having the latest and best in automobiles, buy new Abbott-Detroit models each succeeding season. They know that the Abbott-Detroit is the up-to-the-minute car. Others drive their cars year after year without repair expense and will ultimately buy another Abbott-Detroit.

Could you ask for better proof and evidence of quality of a car than that? Is it not a strong point of merit in this day of keen competition that we

are not only able to hold our trade without effort but find thousands of other critical buyers ordering Abbott-Detroits?

While many motor cars may be made to look beautiful, there is a more vital consideration than appearance alone. A fine looking piano does not always insure good musical qualities. While "good looks" are important, they are by no means the weightier consideration with the careful buyer. The name of the instrument is the point that usually decides. But the wise builder gives both beauty in finish and musical qualities.

So with the automobile. Lasting popularity is only gained by giving and maintaining a high standard of quality. An expert carriage-maker might build a beautiful automobile body. But who would want a handsome body on a worthless chassis? The Abbott-Detroit has combined perfection of mechanical qualities with beauty of design and every other desirable feature more successfully than has any other manufacturer. Nothing is slighted. Our aim has always been to build the most perfect car. In this we have succeeded.

We offer the Abbott-Detroit to those desiring the maximum car.

A FEW OF THE MANY SUPERIOR FEATURES

Continental Motors, Electric Self-Starter, Underslung Spring Construction, Electric Lights, Oversize No-Rim-Cut Goodyear Tires, Booth Demountable Rims, Heavy Artillery Wheels, High-Grade, hand-buffed Leather Upholstery, 12-inch Turkish Roll Cushions, Rain Vision and Ventilating Windshield, Piano Finish, Inside Control, Dash and Extension Lights, Dual Ignition System, Including Magneto, Timken Roller and Schafer Annular Bearings, Spicer Universal Joints, Finest Trimmings, Etc., Etc.

MODELS AND PRICES

34-40 3-Passenger Roadster, 116-inch wheelbase.....	\$1700	44-50 7-Passenger Touring Car, 121-inch wheelbase....	\$2000
34-40 5-Passenger Touring Car, 116-inch wheelbase.....	\$1700	44-50 Battleship Roadster, 121-inch wheelbase.....	\$2150
34-40 3-Passenger Colonial Coupe, 116-inch wheelbase.....	\$2000	44-50 7-Passenger Limousine, 121-inch wheelbase....	\$3050
44-50 5-Passenger Demi-Tonneau, 121-inch wheelbase.....	\$1975	Top, Windshield and Speedometer \$100 Extra	

Abbott Motor Company, 606 Waterloo St., Detroit, Mich.

The Atwater Kent Ignition System



You used to drive your car as a "stunt"

Today you drive it for pleasure or business and the less you have to think about "stunts" the better you like the car.

There was a time when changing gears was a stunt. Keeping the sight feed oiler at its work, and the coil tremblers tuned up, and the gas generator in condition to generate were other feats of that Stone Age of motoring.

But if you had to go through all those *coups de legerdemain* today you would sell your car and use the trolley.

But there's one bit of juggling that you still practice—and it takes some skill, too! That is the manipulation of the spark lever.

There's a difference between managing the spark and managing the throttle. The latter is voluntary; you open the throttle to go faster and close it to go slower. But the former is forced upon you by the peculiarities of the engine. You advance or retard the spark because you must, not because you like to. And many drivers never really get the knack—they advance or retard at the wrong time, and fuel is wasted and bearings strained in consequence.

Hand control of the spark, for ordinary ranges of speed, is really as much a relic of the past as constant regulation of the mixture would be. Just imagine yourself juggling with the carburetor in the way you do with the spark advance! Automatic control is as sure to come in the one case as in the other, and it is already here, for some thousands of motorists who have read the signs of the times and provided themselves with the truly modern kind of ignition service.

We should like to tell you all about the new Atwater Kent System—Type K—not merely because we want to sell it, though naturally that is a factor, but because we know that automatic spark control is the coming thing, and that the Atwater Kent embodiment of that principle gives the ultimate in reliability, efficiency, and convenience. There's not a motorist who installs it but wonders how he ever endured the annoyance so long. And the marvel of it all is the simplicity and low cost of the device!

In another year or two, automatic control will be universally demanded. You will want to be in the forefront. Write your name and address on the margin of this page and we will send you our Booklet "A" and full particulars of the Atwater Kent System without obligation on your part.

ATWATER KENT MFG. WORKS

4934 Stenton Ave., Philadelphia, Pa.

DISTRIBUTORS

New York, E. J. Edmond Co.; Chicago, Motor Car Supply Co., Pellets Magneto Exchange; San Francisco, Chanslor & Lyon Co., Weinstock-Nichols Co.; Los Angeles, E. A. Featherstone; Seattle, Chanslor & Lyon Co.; Portland, Ballou & Wright; Omaha, Omaha Rubber Co., Powell Auto Supply Co.; Dallas and Houston, Fisk Co. of Texas; Wichita, Hockaday Auto Supply Co.; St. Louis, Missouri Auto Specialty Co.; Salina, Lee Hardware Co.; Kansas City, Kansas City Auto Supply Co.; Milwaukee, Julius Andrae & Sons Co.; Detroit, Automobile Equipment Co.; Boston, Motor Supply Shop; Denver, Auto Equipment Co.; Hartford, Post & Lester Co.; Atlanta, Elyea-Austell Co., Chattanooga, Southern Auto & Supply Co.

When Writing to Advertisers, Please Mention Motor Age.

Bosch Plugs

AS GOOD AS BOSCH MAGNETOS



\$1.00
EACH

Obtainable from most dealers, but if they have not stocked as yet can be obtained prepaid from Bosch Magneto Company or Branches.

WRITE FOR
"Locating the Spark Plug"
A FREE BOOK SENT ON REQUEST

WHEN an accessory has performed so consistently that it is considered the zenith of perfect construction, it is the standard by which all others are judged; it is the accessory which you, as a careful motorist, should choose.

The Bosch Plug is such an accessory.

Bosch Plugs have won more important racing events than all other spark plugs combined. In the 14 prominent automobile road races of 1912 Bosch Plugs were used by every winner—14 long trying contests—14 proofs of superiority. The tests included the

Vanderbilt Cup

500 Miles Sweepstakes

Grand Prize

Tacoma Races

Elgin Trophy

Aurora Trophy

Santa Monica Races

World's Auto Road Record

When the majority of racing drivers and manufacturers entering cars in important road races use one make of plug you can be absolutely positive that reliability and efficiency are in that plug to the utmost degree. You can be assured of the Bosch Plug meeting every requirement which you might intentionally or otherwise impose upon it. You make no mistake when you buy Bosch Plugs.

BOSCH MAGNETO COMPANY
214 WEST 46th STREET, NEW YORK
CHICAGO :: DETROIT :: SAN FRANCISCO

\$985

F. O. B. Toledo

Completely Equipped

Self-Starter
30 Horsepower
5-Pass. Touring Car
110 Inch Wheel Base
Timken Bearings
Center Control

\$985

F. O. B. Toledo

Completely Equipped

Remy Magneto
Warner Speedometer
Mohair Top and Boot
Clear Vision, Rain Vision
Wind Shield
Prest-O-Lite Tank

Overland

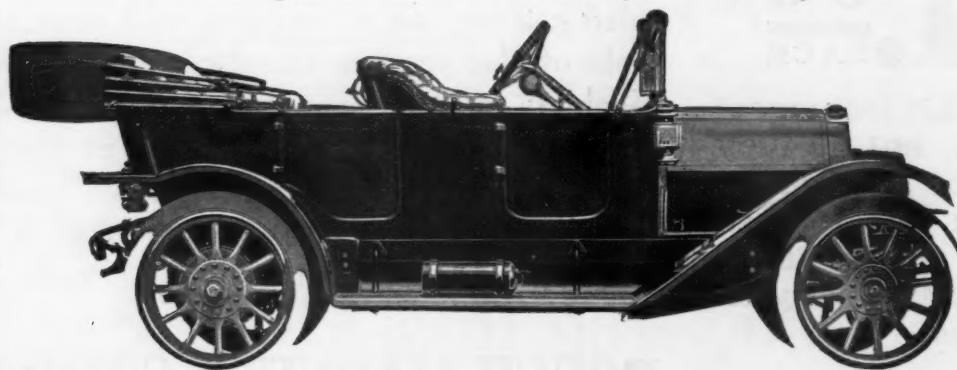
LESS than 25 per cent of all orders for parts, sent to the Overland factory daily, remain unfilled at nightfall.

It is an iron-clad rule that parts orders precede car orders. The unfilled orders are mainly those received too late in the day for shipment.

Each Overland dealer is furnished with a factory supply of parts in addition to his own—and a small army of expert mechanics is constantly on the road at the service of owners. Also, we are building a plant for the exclusive manufacture of parts for obsolete models.

Such is the meaning of Overland service. Catalogue on request. Please address Dept. 46.

The Willys-Overland Co., Toledo, O.



CAPACITY
GURNEY
ENDURANCE

First—Race Contour

Look first to the contour of your ball bearing raceways—for the raceways are about the most important single feature of ball bearing construction. First must come the raceway of right contour, for just so far as you fall short of right contour by just so much do you fail to realize the full efficiency to which you are entitled.

It is the truth of this statement primarily, coupled with the fact that we are able to guarantee correct race contour, that accounts for the unequalled capacity and endurance of

Gurney Ball Bearings

This fact, while not obvious at a glance, can easily be shown, and we urge you to give us an opportunity to demonstrate our point by actual test.

However, there are four essentials to high ball bearing efficiency that are obvious as well as apparent at first sight—namely:

Full Complement of Balls
Solid One-Piece Separator
Uninterrupted Raceways
Full Depth of Raceways to Resist Thrust

Now, mark this well—every bearing to give the fullest efficiency must combine all four of these essentials. The absence of any one means a sacrifice of either capacity or endurance—and yet Gurney Ball Bearings are the only bearings made which combine all of these obvious essentials—the only bearings made that, besides inherently possessing these four essentials, also possess raceways of the right contour.

GURNEY BALL BEARING COMPANY
JAMESTOWN, N. Y.



Greatest Hauling Achievement on Record

—performed by these four KisselKar Trucks

SEVERAL makes of motor trucks were employed in hauling material for the construction of the Big Meadows dam in the California Sierras—the biggest contract of its kind ever undertaken in America. Most of the trucks made sorry work of the task and none were ever able to equal the weekly tonnage carried by the KisselKars. Over trails of decomposed lava, up and down the steepest and most dangerous grades, these three-ton KisselKars plodded continuously for forty days and nights, averaging in daily delivery 80,000 pounds of cement.

This truly marvelous feat proves anew the sturdy and sterling nature of KisselKar construction. A powerful truck, with plenty of reserve strength—able to meet exacting emergencies as well as expected stress.

KISSELKAR TRUCKS

1500 lbs., 1, 1 $\frac{1}{4}$, 2, 3, 4 and 5 tons

A truck to be right must be built of the best and most thoroughly tested materials, put together by skilled workmen under authoritative supervision—tested under the most rigid system. It must have four speed transmission—a lock on the differential to pull a stuck or slipping wheel out of its difficulty—a power plant of tried and unquestioned ability—general construction that will resist vibration. *In brief it must be like a KisselKar.*

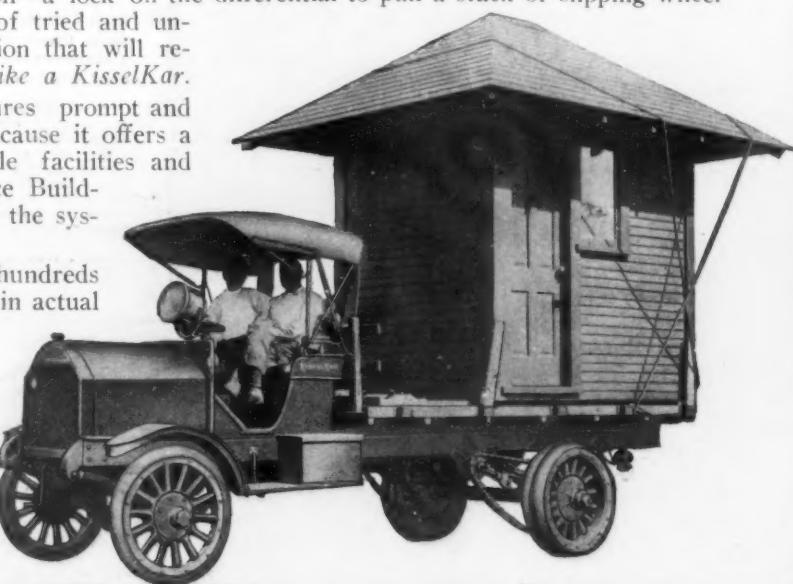
KISSELKAR SERVICE insures prompt and careful attention to truck owners, because it offers a specific policy, ample and accessible facilities and skilled mechanics. KisselKar Service Buildings are at all principal points, while the system reaches the most remote agency.

Send for Truck Portfolio with hundreds of illustrations of KisselKar Trucks in actual use.

Kissel Motor Car Co.

121 Kissel Ave., Hartford, Wis.

New York, Minneapolis, Chicago, Milwaukee, Los Angeles, Dallas, Boston, St. Paul, Kansas City and 200 other leading points.



Starts — Lights — Ignites

REMY

Six Volt System—Does-It-All

Your Car—And The Blacklist

IF the company which builds the electrical equipment on your car is not in business next season, or the following, how much will your car's value be diminished? If your car is equipped with Starting, Lighting and Ignition equipment, built in three different factories, how much greater is the risk?

This is something for both manufacturer and dealer to consider; it is a great, big, vital question which must not be overlooked. Do you want to take chances on your car being blacklisted because of obsolete electrical equipment?

When you equip with Remy Starting, Lighting and Ignition you are making a 14 year old firm, the largest of its kind in the world, responsible for the satisfactory and complete electrical operation of your car; when you equip with Remy apparatus you are not taking chances.

REMY REASONS:

Each REMY starting system is accurately gauged to the size of the car motor. It produces an enormous turning power.

Each REMY **slow speed** Protected Generator has its output regulated inherently. Battery is charged at a non-injurious rate.

More REMY magnetos are in use this season than all other makes combined. Their service is constant; their spark is hottest.

We manufacture this Starting, Igniting and Lighting apparatus in every combination, but the Remy Starting and Lighting Equipment is sold only to car manufacturers.

Write us about our Magneto Exchange offer.
Liberal allowance for any make of old equipment.

Remy Electric Company, Anderson, Indiana

 New York

Detroit

Chicago

BRANCHES:

Kansas City

San Francisco

Minneapolis

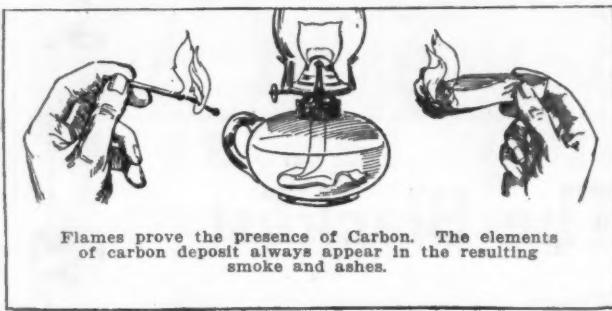
Boston

Service stations throughout the country

CARBON DEPOSIT—How to reduce it

Considerable nonsense is current about carbon deposit.

Any product that will burn must be largely carbonaceous.



Lubricating oil will burn and is therefore plainly carbonaceous. Non-carbon oils cannot exist.

But the amount of carbon deposited depends on the carburetion and gasoline combustion, and on the character of the gasoline, as well as on the lubricating oil itself and its fitness for the car.

The presence or absence of carbon deposit in no way determines the lubricating efficiency of the oil.

Under identical conditions, however, some lubricating oils will give much more carbon deposit than others. This is due, in part, to three conditions:

(1) The crude oil from which the lubricant was manufactured may have been unsuited to gas engine purposes.

(2) The oil may have been improperly manufactured or filtered.

(3) Its "body" may permit it to work too freely past the piston rings into the combustion chambers.

To reduce carbon deposit, it is absolutely necessary to use an oil whose "body" is suited to the piston clearance.

In our chart of recommendations (printed in part on the right) we specify oil of a "body" suited to the piston clearance and other lubricating conditions in each motor.

The oils themselves are scientifically manufactured from the crude bases best suited to motor car lubrication.

They are thoroughly filtered to remove free carbon and other impurities.

If the motorist is particular about his fuel, and his carburetion and ignition, the grade of Gargoyle Mobiloil specified for his car will put an end to unnecessary carbon troubles.

Motorists often select their lubricating oil with an indifference that is little short of reckless. The penalty is paid in a multiplicity of motor troubles.

If he uses oil of less correct "body" or of lower lubricating qualities than that specified for his car in our chart, unnecessary friction must result. Serious damage will ultimately follow.

A booklet, containing our complete lubricating chart and points on lubrication, will be mailed on request.

The various grades, refined and filtered to remove free carbon are: Gargoyle Mobiloil "A," Gargoyle Mobiloil "B," Gargoyle Mobiloil "D," Gargoyle Mobiloil "E," Gargoyle Mobiloil "Arctic."

They are put up in 1 and 5 gallon sealed cans, in half-barrels and barrels. All are branded with the Gargoyle, which is our mark of manufacture.



VACUUM OIL CO., Rochester, U. S. A.

BRANCHES:

NEW YORK BOSTON PHILADELPHIA DETROIT INDIANAPOLIS CHICAGO
29 Broadway 49 Federal St. 4th & Chestnut Sts. Ford Bldg. Indiana Pyth. Bldg. Fisher Bldg.

Distributing Warehouses in the principal cities of the world

The above advertisement appears in the Saturday Evening Post, Collier's, Literary Digest, Life, Scientific American. Other advertisements will appear in Leslie's Weekly, Cosmopolitan, Munsey's, Review of Reviews, World's Work, Century, Harper's, System, Everybody's, McClure's, Outing.

When Writing to Advertisers, Please Mention Motor Age.



Correct Lubrication

EXPLANATION: In the schedule, the letter opposite the car indicates the grade of Gargoyle Mobiloil that should be used. For example: "A" means "Gargoyle Mobiloil A," "Arc." means "Gargoyle Mobiloil Arctic." For all electric vehicles use Gargoyle Mobiloil A. The recommendations cover both pleasure and commercial vehicles unless otherwise noted.

MODEL OF	1909	1910	1911	1912	1913
CARS					
Albion Detroit	A	Arc.	A	Arc.	Arc.
Aico	Arc.	Arc.	Arc.	Arc.	Arc.
American	A	Arc.	A	Arc.	A
Apperson	A	Arc.	Arc.	Arc.	Arc.
"	A	Arc.	A	Arc.	Arc.
Autocar (2 cyl.)	A	Arc.	A	Arc.	Arc.
" (4 cyl.)	B	E	A	Arc.	Arc.
Avery	A	E	A	E	A
Bent	A	A	A	A	A
Buick (2 cyl.)	A	A	A	A	A
" (4 cyl.)	B	A	Arc.	Arc.	Arc.
Californian (1 cyl.)	A	A	A	A	A
" (4 cyl.)	A	A	A	A	A
Cartercar (Cont.)	A	A	A	A	A
Cess	Arc.	Arc.	A	Arc.	Arc.
Chalmers	Arc.	Arc.	B	B	B
Chase	Arc.	Arc.	A	Arc.	Arc.
Cole	Arc.	Arc.	Arc.	Arc.	Arc.
Columbia	A	E	E	A	A
" Knight"	A	A	A	A	A
Coupe Gear	A	A	A	A	A
Daimler	" Knight"	A	A	A	A
Darrac	A	E	A	E	A
De Dietrich	A	B	A	B	A
Detroit-Belleville	B	A	A	B	A
Elmore	B	A	Arc.	Arc.	Arc.
E. M. F.	Arc.	Arc.	Arc.	Arc.	Arc.
Fiat	B	A	A	A	E
Findley	B	E	E	E	Arc.
" (6 cyl.)	Arc.	Arc.	Arc.	Arc.	Arc.
Ford	E	E	Arc.	E	E
Franklin	B	B	Arc.	A	Arc.
" Comt."	B	A	A	A	Arc.
G. M. C.	A	A	A	A	A
Graves	Arc.	Arc.	Arc.	Arc.	Arc.
Granville	A	A	A	A	A
Hanshaw	A	A	A	A	A
Harrington	A	A	A	A	A
" (4 cyl.)	A	E	A	E	E
Hudson	Arc.	Arc.	Arc.	Arc.	Arc.
Hupmobile "20"	Arc.	Arc.	Arc.	Arc.	Arc.
" 32"	Arc.	Arc.	Arc.	Arc.	Arc.
I. H. C. (air)	B	A	B	B	A
" (water)	A	E	A	E	A
International	A	E	A	A	Arc.
Intertate	A	A	A	A	Arc.
Isotta	A	A	A	A	A
Jackson (2 cyl.)	A	E	A	A	A
" (4 cyl.)	A	E	A	A	A
Kelly	A	E	A	A	Arc.
Kelly Springfield	A	E	A	A	Arc.
Knight	A	E	A	A	Arc.
" Comt."	A	E	A	A	Arc.
Kline-Kar	Arc.	Arc.	Arc.	Arc.	Arc.
Knot	B	A	B	A	B
Krit	B	A	B	A	A
Lancia	B	A	B	Arc.	Arc.
Locomobile	Arc.	Arc.	Arc.	Arc.	Arc.
Lubin	A	A	Arc.	Arc.	Arc.
Mack	A	E	A	E	B
Marion	A	E	A	A	Arc.
Marmont	Arc.	Arc.	Arc.	Arc.	Arc.
Matheson	Arc.	Arc.	Arc.	Arc.	Arc.
Maxwell (2 cyl.)	E	E	E	E	E
" (4 cyl.)	E	E	E	E	E
" (6 cyl.)	E	E	E	E	E
Mercedes	A	E	A	E	A
" Knight"	A	E	A	E	A
Mercos	A	A	A	A	A
Mesmerine	Arc.	Arc.	Arc.	Arc.	Arc.
Mitsubishi "Knight"	A	A	A	A	A
Minerva	A	A	A	A	A
Moon	A	A	A	A	A
National	A	A	A	A	A
Oakland	A	E	A	A	A
Oldsmobile	A	E	A	A	A
Overland	A	E	A	A	A
Packard	Arc.	Arc.	Arc.	Arc.	Arc.
Paige Detroit	E	E	A	E	B
Panhard	A	E	A	E	A
" Knight"	A	E	A	E	A
Pathfinder	Arc.	Arc.	Arc.	Arc.	Arc.
Pearson	Arc.	Arc.	Arc.	Arc.	Arc.
Perry Arrow	A	Arc.	Arc.	Arc.	Arc.
" Comt."	A	Arc.	Arc.	Arc.	Arc.
Pope Hartford	E	Arc.	Arc.	Arc.	Arc.
Premier	A	Arc.	Arc.	Arc.	Arc.
Pullman	A	A	A	A	A
Rambler	A	A	A	A	A
Rapid	A	A	A	A	A
Rayfield	A	E	A	A	A
Regal	A	E	A	A	A
Renault	A	Arc.	Arc.	Arc.	Arc.
Reo	A	A	A	A	A
S. G. V.	A	E	A	B	Arc.
Selden	A	E	A	E	Arc.
Service	Arc.	Arc.	Arc.	Arc.	Arc.
Sims	Arc.	Arc.	Arc.	Arc.	Arc.
Sims-Wells	A	Arc.	Arc.	Arc.	Arc.
" Mind"	B	D	D	D	D
Stanley	B	D	D	D	D
Stearns	A	Arc.	Arc.	Arc.	Arc.
" Knight"	A	Arc.	Arc.	Arc.	Arc.
Stevens-Duryea	Arc.	Arc.	Arc.	Arc.	Arc.
Stoddard-Dayton	E	Arc.	Arc.	Arc.	Arc.
" Knight"	A	Arc.	Arc.	Arc.	Arc.
Studebaker	A	E	E	A	Arc.
Thomas	E	E	E	E	E
Walter	A	E	A	A	A
Warren-Dunham	A	Arc.	Arc.	Arc.	Arc.
White (Gas.)	Arc.	Arc.	Arc.	Arc.	Arc.
" (Steam.)	D	D	D	D	D
Whitton	E	Arc.	Arc.	Arc.	Arc.

When Writing to Advertisers, Please Mention Motor Age.

TIMKEN

AXLES & BEARINGS

Twenty Timken Veterans

Having outlived one set of cars, these axles are starting on another 75,000-mile campaign

The twenty cars are gone—literally worn out in the hardest kind of service, that of the taxicab.

Dashing over uneven pavements, around corners, over cobblestones and car tracks—rushing to make a train—out into the suburbs and back—hurry calls at every hour of day and night, where speed might mean life or fortune—

Three long years these cars stood the killing pace and then they were dismissed with the honors of war.

The veteran Timken-Detroit Rear Axles, too, were mustered out—but they have re-enlisted!

In all those twenty times 75,000 miles there wasn't a broken gear or Timken bearing! The axles are in perfect condition!

And now their owner, The Walden W. Shaw Livery Company of Chicago, is building twenty new cars, under which these Timken veterans will serve for years to come.

The Shaw company have been in the taxicab business for five years. They keep accurate records. They know values of every part. The first three years Paul H. Geyser, Manager of the Mechanical Department, tried out cabs with various types of axles and bearings. Since then he has used only Timken.

There are big reasons—and mighty interesting stories back of Timken records of service. You'll find them in the Timken Primers, T-1 "On the Anatomy of Automobile Axles," and T-2 "On the Care and Character of Bearings." Sent free, postpaid, from either address below.

THE TIMKEN-DETROIT AXLE CO.
Detroit, Mich.

THE TIMKEN ROLLER BEARING CO.
Canton, Ohio

Why You Should Buy *Guide* Lamps

Guide lamps are made of carefully selected, heavy material by skilled workmen. They are scientifically constructed to give the greatest amount of light possible per candle power and maximum service under all conditions.



The Lamps with the Great White Ray

Your money will be cheerfully refunded by your dealer or by us if Guide lamps fail to make good after a fair trial. Before you buy new lamps, write for Guide book No. 6. It tells you what is best in lights, and what lamp to choose for a particular purpose. Write today.

The Guide Motor Lamp Mfg. Co.
EAST 4th ST., CLEVELAND, OHIO

(23)

Save Road Delays and Your Temper

Most ignition and lighting trouble is due to the poor cable furnished with some lighting or starting system. To save a few cents on each system the makers risk their reputations and cause trouble for you. Owners of the best cars have little lighting or ignition trouble because they use

Packard
CABLE

Lasts as Long as Your Car

Make every trip certain, avoid delays and trouble by demanding Packard Cable in your new car, or when you have your old car rewired.

Remember Packard Cable resists oils, water, heat and dirt. You won't have any more broken terminal trouble if you hook up to Packard Cable.

If your garage man or automobile dealer doesn't have Packard Cable, write us for a sample. It's the cable with the brown covering, striped with red.

(34)

The Packard Electric Co.
Dept. C Warren, Ohio



The Electric Will Meet Every Requirement

Besides having the advantages of comfort and appearance, an Electric is the cheapest car for you to own. A chauffeur is unnecessary—you can learn the simple operation of an Electric very quickly. Operating cost is far less than that of any other type of car. Wear and tear on tires and mechanical parts is reduced to a minimum.

In an Electric, one lever suffices for all speeds. Your operation of it is so easy because the required movement seems the natural thing to do. The driver of an Electric is free from the strain experienced in driving other types of automobiles long distances.

There is no cranking necessary with an Electric. No gear-shifting—no backfiring—no unexplainable balking at critical junctures. It is an understandable car, and starts or stops instantly as desired. You really should investigate its merits now.

Interesting literature about Electric Vehicles sent gladly. Write today.

Before You Buy Any Car—Consider the Electric



BOSTON

**ELECTRIC VEHICLE
ASSOCIATION OF AMERICA**
NEW YORK
124 W. 42d St. CHICAGO
17B

When Writing to Advertisers, Please Mention Motor Age.



A Spark Plug— Plus a Priming Cup

ALL-IN-ONE Spark Plugs have every good feature found in the best plugs on the market—plus a priming cup. This cup enables you to prime your motor instantly with a few drops of gasoline.

This cup enables ALL-IN-ONE Plugs to clean themselves. Pour a few drops of kerosene into it, open the pet cock, let your motor run and all soot, oil and grease will be blown off the sparking points.

This cup enables you to stop that knocking. By injecting a few drops of kerosene into your cylinder through the cup, all carbon and gummy deposits in them is "cut."

Do you realize that in trouble experienced, in time wasted, that you are paying right along for being without ALL-IN-ONE Plugs? Get yours today.

Price \$1.25

Frontier Specialty Co.

539-543 Ellicott Street

Buffalo, N. Y.

START YOUR CAR FROM THE SEAT WITH A SANDBO^{MECHANICAL} STARTER

The SANDBO is a mechanical starter. It is a complete unit in itself, dependent upon neither motors, batteries, gas tanks nor air pumps for motive power. Consequently its upkeep is absolutely nothing.

Its efficiency is always 100%, because there is nothing about it to get out of order—no wires to short circuit, no gas to leak, no air to lose compression. One or two quick pulls on a dash handle connected by a cable to the SANDBO STARTER suffices to turn your motor completely over. You start your car from the seat—not out in front standing in a mud-hole. Churning a wrist-wrenching crank is done away with. Broken arms from "kick-backs" are impossible. A woman or a 12-year-old boy can start a car as safely as if it were an electric.

A FORD Can't Afford To Be Without One



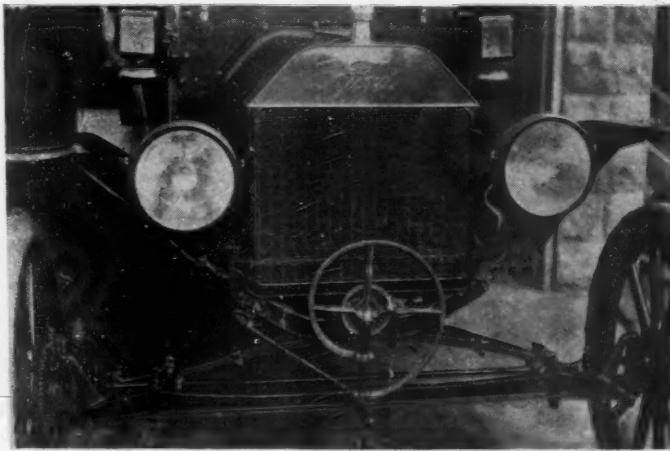
One hand enough
No surplus cable

The SANDBO STARTER is especially adapted to FORD cars. It can, however, by means of a stub-shaft, be attached to almost any make car. The crank may be removed if desired. The starter complete weighs but 5 pounds. It takes but 30 minutes to attach it.

MOTORISTS! Enjoy all the comforts of a self-starter at nominal cost. A SANDBO costs little at the outset—it costs nothing to operate. It is the simplest, quickest, most effective, and cheapest starter of its kind on the market. See your dealer or write us direct.

Dealers wanted everywhere. Write for generous sales proposition.

SANDBO STARTER CO.
Bennett, Iowa



When Writing to Advertisers, Please Mention Motor Age.

GAS, GASOLINE and OIL ENGINES

INCLUDING GAS PRODUCER PLANTS



Sixteenth edition.
Revised, enlarged and reset.

By
GARDNER D. HISCOX
M. E.

Author of
"Mechanical Movements,"
"Compressed Air,"
Etc., Etc.

Price, \$2.50
Charges Prepaid



THE only complete American book on the subject for Gas Engine Owners, Gas Engineers, and intending purchasers of gas engines, treating fully on the construction, installation, operation and maintenance of gas, gasoline, kerosene and crude petroleum engines.

The new rewritten, enlarged and revised 16th edition of this work has been prepared to meet the increasing demand for a thorough treatise on the subject. Its 450 pages give general information for everyone interested in this popular motive power, and its adaptation to the increasing demand for a cheap and easily managed motor requiring no licensed engineer. It is fully illustrated by 351 Engravings and Diagrams.

CONTENTS.

Introduction. Theory of the Gas and Gasoline Engine. The Utilization of Heat and Its Efficiency in Explosive Motors. Retarded Combustion, Wall-Cooling and Compression Efficiencies. Compression in Explosive Motors, and Its Work. Causes of Loss and Inefficiency in Explosive Motors. Economy of the Gas Engine for Electric Lighting, etc., etc. The Material Power in Explosive Engines. Carburetors. Cylinder Capacity of Gas and Gasoline Engines. Governors and Valve Gear. Explosive Motor Ignition. Cylinder Lubricators and Mufflers. Construction Details and Parts of the Explosive Motor. Explosive Motor Dimensions. Types and Details of the Explosive Motor. The Measurement of Power. Management of Explosive Motors. Explosive Engine Testing. The Amateur's Motor, Marine Motors, Motor Bicycles, Tricycles and Automobiles. Kerosene Distilling and Petroleum Oil Motors. Producer Gas and Its Production.

The Class Journal Company
910 S. Michigan Avenue Chicago

Milwaukee MOTORS

Marvels of Silence and Durability

So quiet running is the MILWAUKEE under the hood that it has been aptly described as "The Humming Motor." A scarcely perceptible humming is the only evidence of its presence.

Vibration in MILWAUKEE construction has been reduced to the absolute minimum. The persistent rattle and shaking which shortens the life of so many motors is completely designed out of the MILWAUKEE—one reason MILWAUKEE Motors are unexcelled in length of service.

No matter whether you are building pleasure cars, light or heavy trucks, you should put your 1914 motor question up to engineers who are prepared to show you how to increase the efficiency and, consequently, the sale of your output. Write us.

In point of clean lines, compactness, accessibility, MILWAUKEE MOTORS are conceded by authoritative engineers to be without a superior. They are furnished as UNIT POWER PLANTS or without transmission, clutch and control. They are built to accommodate any standard transmission. They can be equipped with any standard electric starting and lighting device. They are dust and oil proof.

BUILT IN THE FOLLOWING SIZES

4-CYLINDER MOTORS

4 5/16x4 1/2, Unit Power Plant or Alone, Cylinders Cast in Pairs.
4 1/2x5 1/4, Unit Power Plant or Alone, Cylinders Cast in Pairs.
4 1/2x5 1/4, Unit Power Plant or Alone, Cylinders Cast in Pairs.
4 1/2x6, A Special Truck Motor. Cylinders Cast in Pairs. Not furnished as Unit Power Plant.
4 1/2x5 1/2, Unit Power Plant or Alone, Cast en Bloc. For Pleasure Cars and Light Trucks.

6-CYLINDER MOTOR

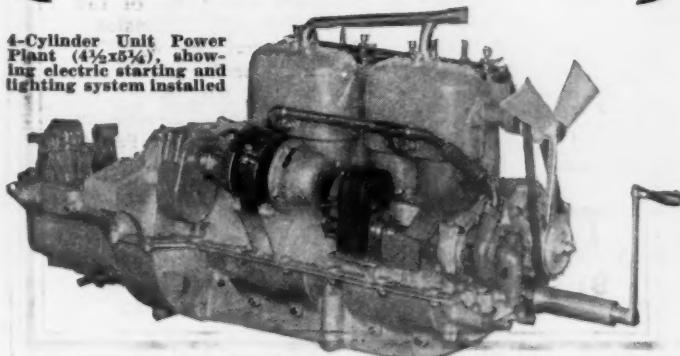
4 1/2x5 1/2, Unit Power Plant or Alone, Cast en Bloc.

WRITE FOR DESCRIPTIVE MATTER

Milwaukee Motor Co.

MILWAUKEE, WISCONSIN

4-Cylinder Unit Power Plant (4 1/2x5 1/4), showing electric starting and lighting system installed



When Writing to Advertisers, Please Mention Motor Age.



Automobile Tires

4,000 Miles, and More

Mr. Dealer, you know, from long experience, that quality regulates tire mileage, don't you? That is reasonable.

So, in Marathon Automobile Tires, we build in maximum quality to insure maximum mileage.

Marathon quality—far above the average—makes our guarantee of 4,000 miles the least possible service. The average mileage is much greater.

That means extra service to your customers, and pure satisfaction to you.

Slow, Careful Building

Hasty building is often the cause of poor tires. Marathon tires are hand built by skilled, long experienced men. Built very slowly—double time is given, if necessary. Never are Marathon tires rushed out.

This very slow and careful hand building insures absolute accuracy. It prevents errors. It means perfect tires.

This process increases our cost, but it cuts the cost to users.

The best—most costly—materials, built-up in this way, largely explains Marathon extra mileage.

Angle Non-Skid Tread

Here is the utmost in Non-skid efficiency. The angle tread grips in every direction. It prevents skidding and gives 100 per cent. traction.

The Marathon tread stock is made under our exclusive formula—one that gives rubber the utmost wear-resistance.

In addition to the high set sharp angles, is the plain tread underneath. This is very thick. The two together insure very long mileage. And the Non-skid feature is lasting.

Concentrated Wear

The Marathon tread is very thick in the center—thickest where the most wear comes. And thin on the sides, so there is no waste. This exclusive Marathon feature alone means extra mileage.

Sell the Best Tire

Your trade deserves the best tire. You can't afford to endanger your business with any other. Marathon is the tire you want. We want to prove it to you. Send for a sample and our catalog.

We'll help you sell Marathons. We give you real co-operation. Write today for our proposition.

The Marathon Tire & Rubber Co.

Cuyahoga Falls, Ohio

DISTRIBUTORS IN MOST LARGE CITIES



Don't Bother with Dirty Spark Plugs



There's a "Soot-Proof" plug which actually cleans itself.

It was invented by C. A. Mezger—one of the oldest makers. A man who has spent twelve solid years in solving spark plug problems.

It is warranted not to short circuit, not to leak. And not to call for replacement one-third as often as any old-type spark plug.

It is built with a double chamber. Thus it offers at least **three times** the resistance of any other spark plug made.

These are not mere assertions. Over two million "Soot-Proof" plugs are now in actual use. They are found today on hundreds of thousands of the best-built American cars.

Almost half the motorists you meet know these "Soot-Proof" plugs. And they know their spark plug troubles were ended the day they put in these plugs.

There are balky plugs, feeble plugs, plugs that carbonize, plugs that soon wear out. But it is your own fault if you get such plugs, when legions of men know of one plug that doesn't.

It will save in replacement at least two-thirds of what one spends without it. It saves the cleaning, saves the carbon troubles.

It insures at all times the hottest spark of which your current is capable.

Get them from your dealer. If he can't supply, find a dealer who can. Or send to us direct. It is well worth while to be guaranteed against spark plugs that clog up, balk and give out.

C. A. Mezger "Soot-Proof" Spark Plugs

C. A. MEZGER, Inc., 15 Canal Place, New York

Philadelphia, 1427 Vine St., Petry-Cassidy.
Chicago, 1430 Michigan Boulevard, F. E. Sparks
Detroit, Ford Building, H. E. Butcher
Denver, 15th and Curtis Sts., Hughson & Merton

Portland, 329 Ankeny St., Hughson & Merton
Seattle, 924 E. Pike St., Hughson & Merton
Los Angeles, 1229 So. Olive St., Hughson & Merton
San Francisco, 530 Golden Gate Ave., Hughson & Merton



Motorists! Save Time,
Trouble—
Expense. Master your Motor.
IT'S EASY IF YOU READ

The Modern Gasoline Automobile

Its Construction, Operation, Maintenance and Repair

By VICTOR W. PAGE, M. E.

Over 700 (6 x 9) Pages TEN LARGE FOLDING PLATES 500 Illustrations

PRICE \$2.50 Covers Every Phase of Modern
Automobile Practice

The latest and most complete treatise on the Gasoline Automobile ever issued. Written in simple language by a recognized authority, familiar with every branch of the automobile industry. Free from technical terms. Everything is explained so simply that anyone of average intelligence may gain a comprehensive knowledge of the gasoline automobile. The information is up-to-date and includes, in addition to an exposition of principles of construction and description of all types of automobiles and their components, valuable money-saving hints on the care and operation of motor cars propelled by internal combustion engines. Among subjects treated are: Torpedo and other symmetrical body forms designed to reduce air resistance; sleeve valve, rotary valve and other types of silent motors; increasing tendency to favor

worm-gear power-transmission; universal application of magneto ignition; development of automobile electric-lighting systems; block motors; underslung chassis; application of practical self-starters; long stroke and offset cylinder motors; latest automatic lubrication systems; silent chains for valve operation and change-speed gearing; the use of front wheel brakes and other detail refinements.

By a careful study of the pages of this book one can gain practical knowledge of automobile construction that will save time, money and worry. The book explains just what to do, how and when to do it. Nothing has been omitted, no detail has been slighted. Every part of the automobile, its equipment, accessories, tools, supplies, spare parts necessary, etc., have been discussed comprehensively.

Not too Technical for the Layman—Not too Elementary for the More Expert

THE CLASS JOURNAL COMPANY, 910 South Michigan Ave., Chicago, Ill.

Why don't you own the vulcanizer you're paying for?

Yes, actually paying for it in tire service that you might have—but don't get. You know what happens when you let a casing cut gather dirt and water for a hundred miles. The fabric, that ought to be protected by the tread, rots, and you have a blow-out that ruins the tire.

Unless you have a vulcanizer, casing cuts will never get any attention. They don't look important enough to turn over to a garage for repair.

Result—you buy two tires where one would do as well.

SHALER Vulcanizer

If you'll fill the cuts and gashes in your tires with new, live Para rubber, and weld it in with a Shaler Vulcanizer, the tire will be as good as new until the tread is worn through. Why endure the trouble and danger and expense of blow-outs when there's this sure remedy? There is no satisfactory substitute for vulcanizing. No other method makes permanent repairs. All tube injuries are mended with the same vulcanizer.

You or your chauffeur can do the work in spare moments. No skill or experience necessary. Full directions and a supply of repair material accompany each machine.

Shaler Vulcanizers operate from your electric lighting circuit or with alcohol lamp. Prices, \$2.00 and up.

C. A. SHALER CO.

218 Fourth Street

WAUPUN, WIS.

Send This Coupon
today and receive a
complimentary copy
of "Care and Repair
of Tires." It gives a
remedy for every
tire emergency.
Write today.

Send me a copy of Care and Repair of Tires Free.
NAME
ADDRESS

C. A. SHALER CO.,
218 Fourth St.,
Waupun,
Wis.



Diamond{No-Cinch}Tires

made of Vitalized Rubber are built with extra air-room

It's the extra air-room that does the work. The more air-room in your tires means more resiliency, and a greater ability of the tire to absorb the shock of the road, insuring more comfort for you and your passengers—*more comfort for your tires.*

This more air-room tire does the work easily and will not strain under road usage. The extra air-room is gained for you without lessening the thickness of the tread or weakening the side walls.

So this time specify Diamond Vitalized Rubber Tires — you can get them in all sizes and types at any one of the



Perfect 3-Point Rim Contact
holds with a vise-like grip

25,000 Diamond Dealers always at your Service

DIAMOND SAFETY (SQUEEGEE) TREAD FOR AUTOMOBILES, MOTORCYCLES, BICYCLES



“AUTO-LITE”

The Original Six-Volt Electric Starting and Lighting System

THE “Auto-Lite” electric starting and lighting system has always been a six-volt system. We were the pioneer manufacturers of starting and lighting devices employing a six-volt current.

We never wasted time and money experimenting with higher voltages. We saved ourselves the disappointments and troubles experienced by manufacturers of 24 and 12-volt devices. And when our perfected six-volt system was ready for the market it needed no changes nor “refinements.” We did not allow the sudden demand for these appliances to induce us to place a complicated and unsatisfactory high-voltage system on the market.

We have no side line—the “Auto-Lite” electric starting and lighting system is our only product, and re-

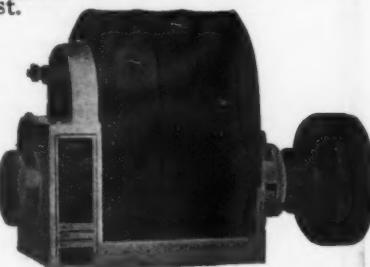
ceives all our attention. We are electrical accessories experts.

MANUFACTURERS:—Our starting and lighting device is the most simple, rugged and dependable on the market. We are among the largest exclusive makers of electric starting and lighting devices in the country. Our factory facilities are such that we handle the largest orders promptly.

DEALERS: We have an especially attractive proposition on lighting alone.

PROSPECTIVE OWNERS: You will want the simplest and best starting and lighting device on your new car. You must know about the “Auto-Lite,” in order to be able to demand the best.

Our handsomely illustrated catalogue and literature will be sent free and postpaid, on receipt of name and address. Write today.



THE ELECTRIC AUTO-LITE COMPANY
MAIN OFFICE AND FACTORY, 
TOLEDO, OHIO
BRANCH OFFICES: NEW YORK, KANSAS CITY, SAN FRANCISCO



Transmissions



Steering Gears



"The value of our product is not in its price—but in the service rendered"

Differentials !!!

"Mechanically perfect assemblies
of latest design
all powers and ratios
both spur and bevel type.
Write for catalogue and details."

WARNER GEAR CO., Muncie, Ind.



Model D-51

DETROIT OFFICE

Differentials



628 FORD BLDG.



Control Levers

Bearing Friction and its Elimination

Why Balls are Superior Friction Reducers and how their correct application insures Maximum Conservation of Energy



Published by Engineering Department
New Departure Manufacturing Co.
BRISTOL, CONNECTICUT, U.S.A.

Can We Send You A Copy of this Booklet?

Our Engineering Department has published the first of a series of booklets discussing the latest developments in the solving of bearing problems.

This first brochure is entitled "Bearing Friction and Its Elimination," and aims to show why balls are superior friction reducers and how their correct application secures maximum conservation of energy.

The types of bearings particularly discussed and compared in this writing are the ball and roller bearings, as applied to all bearing points in the motor car.

It discusses and explains the growing tendency among engineers and manufacturers to favor the ball type of bearing, as evidenced by the summarization figures published by the "Horseless Age" in a review of 1913 pleasure car models. These figures show that ball bearings are used in the differential of 53% of pleasure cars for 1913, as against 37½% of the 1912 models; in the transmission of 75%, as against 64%; and in the rear wheel of 52%, as against 42%.

This brochure will interest you. Copy will be mailed you promptly on request.

**The New Departure Manufacturing Company
Bristol, Conn.**

WESTERN BRANCH:
1016-17 Ford Building Detroit

See this page
next week for
first pictures
of the Ohio
Top Hoist.

The Ohio Top & Manufacturing Company
TOLEDO, OHIO

OVERHAULING TIME IS TIME TO INSTALL



PISTON (PATENTED) RINGS

When you have your car overhauled this spring, tell the repair man to "scrap" your old piston rings. Tell him to substitute a set of LEAK-PROOF Rings. Tell him that you want to know if they will

Increase Power Lessen Carbonization Decrease Fuel Consumption

If LEAK-PROOF Rings will make your motor a 100% motor—if they will pay for themselves in fuel saved—chop a big item off your gasoline bill for the year—you can't afford to be without them. The proof of LEAK-PROOF Rings is in the motor. **ASK THE USER.**

LEAK-PROOF Rings are made in all sizes, for all requirements. They may be obtained from any supply house, garage or repair shop.

McQUAY-NORRIS MANUFACTURING CO., Dept. "M," ST. LOUIS

BRANCH OFFICES AND MANAGERS

New York, N. Y., H. P. MARSH, 58 Lincoln Sq. Ct., 64th & Broadway	San Francisco, Calif.....	WM. B. GODFREY, 268 Market St.
Chicago, Ill., H. G. PARO, Suite 39, Merch. Bldg., 106 N. La Salle St.	Kansas City, Mo.....	CHAS. H. ECKHARD, 3123 Michigan Ave.
Pittsburgh, Pa.....	Los Angeles, Calif., W. H. STEELE, 822 Cen. Bldg., 6th & Main St.	
Fort Worth, Texas.....		E. S. MOBERLY, 108 Bryan St.

Reduce Your Repair Expense—Add a Year or Two to Your Car's Life



Easy for anyone to put on. No drilling or otherwise marring the car. Noiseless at all times. Requires no readjustment and will outlast the car.

Snubbers reduce this trouble to a minimum by **checking the rebound** of the springs. They prevent the car body from bouncing up too suddenly and too high, and coming down too far.

They steady the riding as no other device can, because they are the **one** shock-preventer especially adapted to high-set flexible springs now universally used.

Standard Equipment on the Easiest-Riding Cars
WHITE STEARNS PEERLESS

SEND FOR NAME OF NEAREST AGENT AND ARRANGE A TRIAL

GABRIEL HORN MFG. CO., 1415 E. 40th ST., CLEVELAND, O.

The New Carburetion Method Mondex-Helix Used in Combination with Any Carburetor Reduces Gasoline Bills 25% to 40%.

Now universally used on Auto Trucks, Taxicabs, Pleasure Cars, Motor Cycles and ALL gasoline motors, and giving results that are *simply wonderful*—actually *saving* from 25% to 40% gasoline!

It almost *doubles* the power of poor gasoline. It gives 100% *increased* flexibility. It *increases* power on hills and grades, at all speeds—from 10% at high speed, to 50% at low speed—especially with heavy loads. It *prolongs* the life of a motor, making the noisiest *silent* and *smooth* and allowing *EASIER* starting.

It *prevents* back-firing and carbonization. It has no moving parts, and is simply inserted in intake of manifold like a cartridge in a gun. Write for booklet "N."

RELIANCE AUTOMOBILE CO., Agents for Pacific Coast, San Francisco, Cal.

PROOF

Used by the Con-Gas Co., N. Y.; I-T-O-A Cab Co., Knox Automobile Co., Selden Motor Vehicle Co., Western Electric Co., L. I. R. R. Co., Mason-Seamon Trans. Co., U. S. Motor Cab Co., Quaker City Cab Co., Ford Motor Co., N. Y., etc.

MONDEX SHOCK PREVENTERS

Won the Vanderbilt Cup for Mulford and for R. DePalma, the Grand Prize for the late David Bruce-Brown and for C. Bragg, and the Tiedeman Trophy for Witt.

"Motor Car Racing" says: "Mondex Shock Preventers proved they are right—in the highest court of mechanical test known to the automobile engineering world." Their use saves wear of tires and eliminates all vibration.

THE ARISTOS CO., Dept. "N," 250-8 W. 54th St., New York

When ordering, Address Dept. "N," giving make, model of car or inside diameter of intake manifold. Sent with full instructions, C. O. D. or by mail on receipt of price.

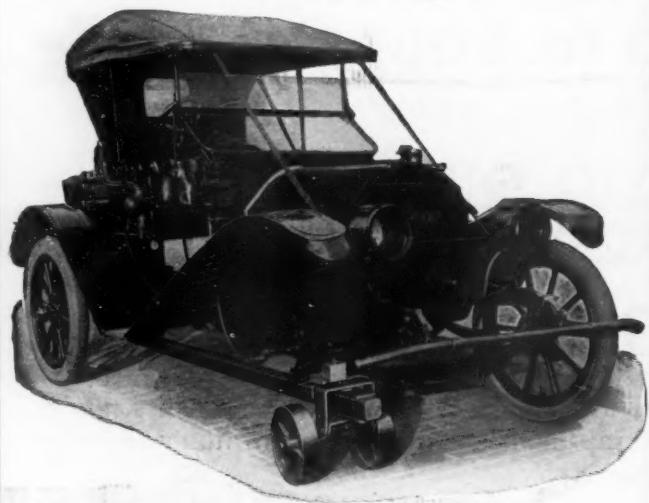
Sizes, 1 inch to **\$3**
1 $\frac{1}{2}$ inches

Sizes, 1 $\frac{1}{2}$ ins. to 2 ins. **\$4**

Agents Wanted



Holmes Wrecking Truck



C Takes the place of either front or rear wheel, broken axle or spindle. Car can be towed to garage at full speed.

List Price . . . \$35.00

Manufactured By

Robt. Holmes & Bros., Danville, Ill.

Neither
Rain, Mud
Nor Dust
Can Harm

your luggage when it is carried in the new rain-proof, water-proof

Kamlee Auto Trunk

"Made by Trunk Makers Who Are Motorists"

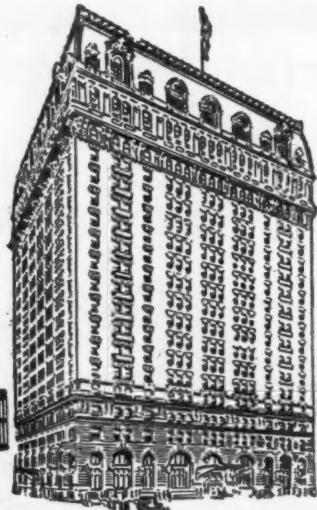
Embody every desirable feature—strength, lightness, durability, beauty. It adds to rather than detracts from the appearance of any car.

Consider these exclusive Kamlee features before you buy an auto trunk, then you'll surely select a Kamlee: patent drop front—no lifting of lid—patent inter-locking edge makes it air-tight, dust-proof, rain-proof; no straps to bother with in opening; fitted with standard suit-cases permitting removal of one party's luggage without disturbing others.

Ask Your Dealer or write us for price and descriptive circular. If your dealer can't supply you, we'll gladly ship you a Kamlee on approval.

THE KAMLEE CO.
234 Broadway, Milwaukee, Wis.

Look for the Red and
Gold Diamond
Inlaid Right on
Front Cover



Hotel La Salle

CHICAGO'S FINEST HOTEL

ERNEST J. STEVENS, Vice-Pres. and Mgr.

Located in the heart of the city, within easy reach of all railway terminals

RATES

ONE PERSON Room with detached bath..... \$2 to \$3 per day

Room with private bath..... \$3 to \$6 per day

TWO PERSONS Room with detached bath..... \$3 to \$5 per day

Room with private bath..... \$5 to \$8 per day

TWO CONNECTING ROOMS WITH BATH

Two persons..... \$5 to \$8 per day

Four persons..... \$8 to \$15 per day

SUITES..... \$10 to \$35 per day

LA SALLE AT MADISON STREET, CHICAGO



There is but one Ford model. And for five years our rapidly growing factories haven't been able to make all we could sell—because it is right. More than a quarter of a million Fords now in service. New prices \$525 to \$800. Dealers everywhere. Ford Motor Company, Detroit,

HERZ PLUG

Eventually you will disregard the cheap hardware commonly called "Spark Plugs," and use the HERZ PLUG — the only Plug that is or can be

Guaranteed A Year!

The usual Spark Plug troubles are unknown to users of the HERZ PLUG. Once installed, it never is taken out.

Double Blue Enamel Stone

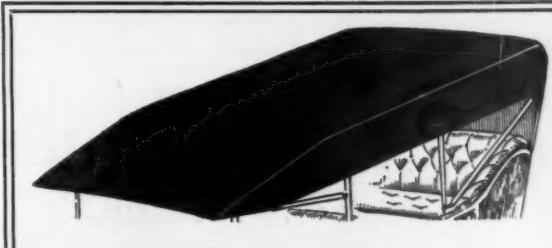
No Sooting — No Cleaning — No Porcelain — No Breakage.

No Experiment: In Its 20th Year

Price \$1.50 postpaid. Ask your dealer, or write us.

We also make the HERZ MAGNETO

HERZ & CO.
295 Lafayette St., New York



Keep Your Top New

as clean and waterproof as the day you got it—prolong its life—preserve it against shabbiness, wear and decay.

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whether Rubber, Cravette, Leather or imitation leather—leaves a silk thread finish on Mohair tops. Reduced it will lengthen the life of any top of any material. NOT a paint or varnish but a scientific, laboratory product. Very economical.

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Any dealer will refund your money if RUB-R-TITE or any of our Auto Aids fail to give you unqualified satisfaction.

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Get this little book with its many valuable hints on how to care for a car, how to save expense, together with its description of our easily applied and economical Auto Aids—Rub-On Auto Top Lining Dye, Col-R-Oi Leather Dye, Rub-On Varnish, Stay-On Enamel, Stay-Fix Radiator Mend.

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Howell's Perfection Decarbonizer

IT CUTS THE CARBON

Here at last—a decarbonizer that actually works. We positively guarantee it to clean your automobile engine, pistons and valves slick as a whistle. Non-explosive. Non-inflammable. Will not corrode, pit or injure. When your engine begins to hammer and overheat, with consequent loss of power—it's the carbon. Pour $\frac{1}{2}$ pint of HOWELL'S PERFECTION into each cylinder and let it stand over night. In the morning your engine will be new again. No work, no fuss, no loss of time and cost practically nil. 1 quart can f. o. b. Chicago for \$1.00. It has made good. It cuts the carbon. It will do all we say and more or you can have your money back.

Also for Motor Cycles, Boats and All Gasoline Engines

Put Your Machine In Order Clean the Engine with Howell's Decarbonizer
Polish the Body with Autol Body Polish
Stop the Leaks with Perfection Radiator Compound.
If your dealer cannot supply you we will ship for \$3.00, freight prepaid, the following: 1 qt. Decarbonizer (\$1), 1 qt. Autol (\$1), 1 lb. Sunbright (50c), and 1 lb. Radiator Compound (75c). Send dealer's name for booklets covering Howell Products.

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No matter whether your present tires are new or old, this book will put dollars in your pocket. If new, it shows how to make them last three seasons instead of one—10,000 miles instead of 5,000. If old, rim cut and rut worn, it shows how to make them last a whole extra season.

"From Hide to Highway" does not deal in generalities, it is concrete—definite—and contains a copy

of the most remarkable money-back guarantee ever issued—a guarantee of 5,000 miles without puncture.

But why go into detail here when your copy of "From Hide to Highway" is all wrapped up ready to mail without the slightest obligation attached? Don't even bother to write—merely fill out and mail the coupon today and your copy will reach you without cost by return post—surely, a book which has led to a saving of \$2,000,000 to 20,000 other motorists is at least worth sending for. Mail the coupon NOW—

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My tire sizes are

Make the pumping of your tires a pleasure instead of a task. Most of your tire trouble is the result of inadequate inflation.

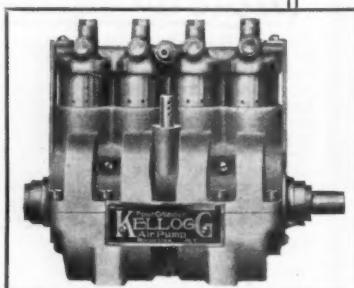
You need the

Four Cylinder
KELLOGG
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because it pumps your tires to any desired pressure in less than three minutes and is the simplest pump in construction it is possible to make. Every pump is thoroughly tested and guaranteed.

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For the Private Garage

In your private garage you have one, two, three, or possibly more cars. Your mechanic does much to keep these cars in order, but he also avoids much because of the unfavorable conditions he is forced to work under. If he has to get down on his back to crawl under a car, he isn't going to look for trouble—anticipate it. When the car acts up is time enough to get busy.

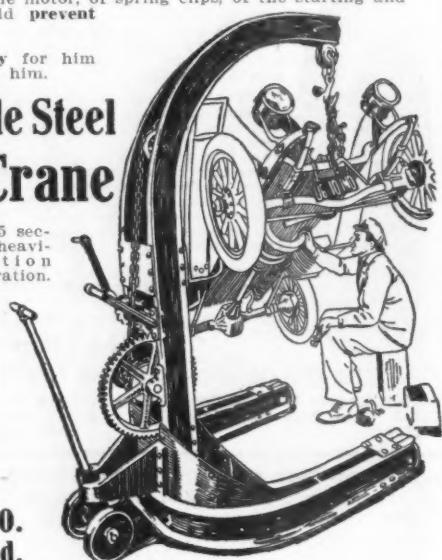
The mechanic **knows** that a monthly inspection of every nut and bolt, of the cam shaft, of the connecting rod bearings, of the entire under side of the motor, of spring clips, of the starting and lighting wiring, would **prevent** trouble.

Make this work **easy** for him and he'll do it. Ask him.

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Will enable him in 45 seconds' time to put the heaviest car in the position shown in the illustration. Makes under side of car as accessible as the upper, for all sorts of adjustments. Light is always full on his work. Crane is on roller bearing wheels. Can't tip under any load. Securely double-locked. Built in three sizes. Write for prices.

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METERS are as essentially a part of the electric lighting equipment as gauges are a part of the steam boiler, and who would think of operating even a small steam heater without suitable gauges?

True, the hazard is greater with the boiler, but the safety valve takes care of that.

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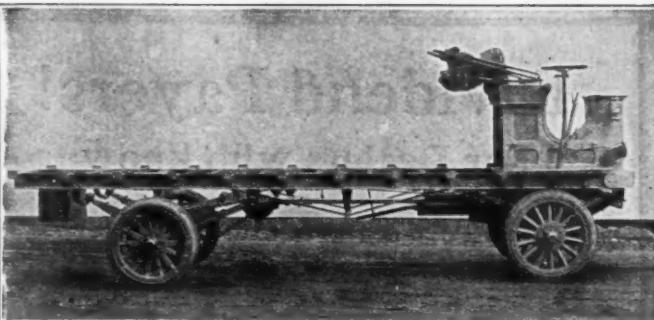
If a manufacturer tells you that meters are unnecessary with his lighting equipment, he deceives himself. If you rely on his statement, you deceive yourself.

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are the accepted standard in automobile lighting.

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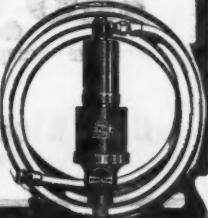
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Weights only 2½ pounds. Furnished with adapters to fit any car, 12 feet of hose and connections. Price \$10.00. With Pressure Gauge, \$2.00 extra.

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The horn with the effective tone—does not screech or squawk.

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Pat. April 2, 1912.

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Recommended by manufacturers and garages. Get two to clean your motor quickly—you can clean two cylinders at one time. State kind of motor when ordering.

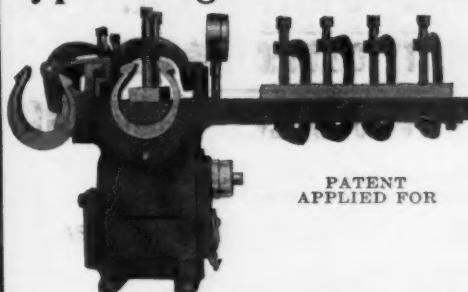
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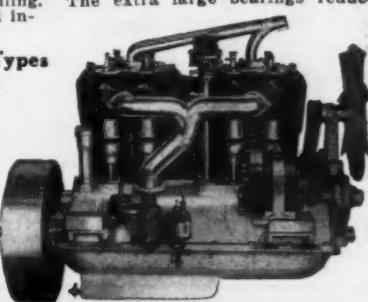
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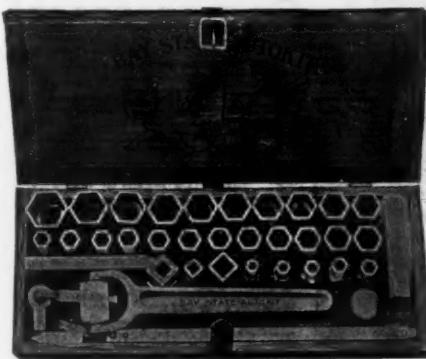
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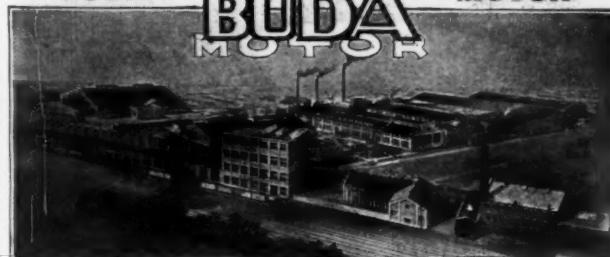


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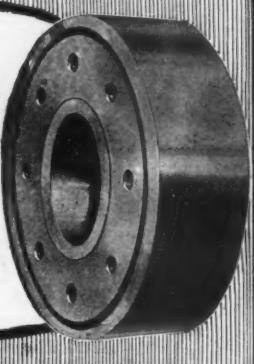
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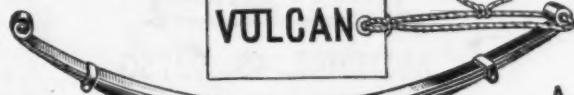
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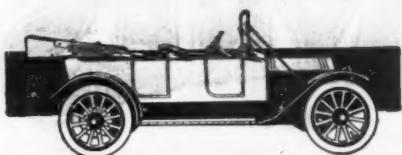
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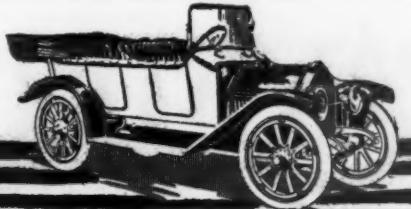


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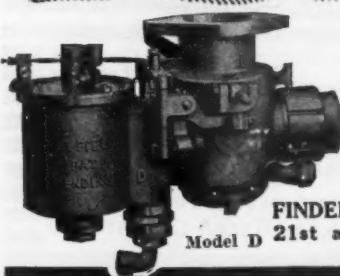
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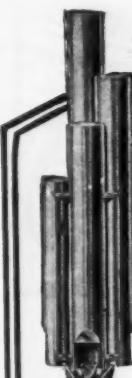
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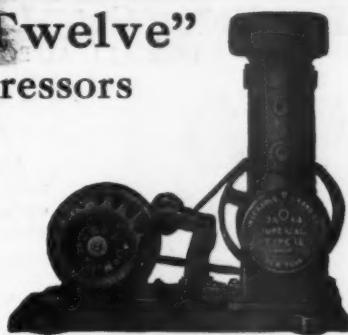
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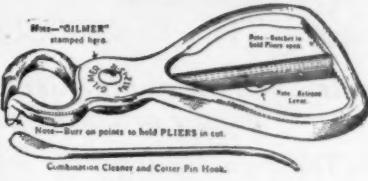
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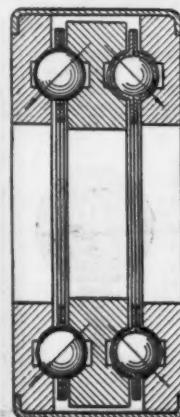
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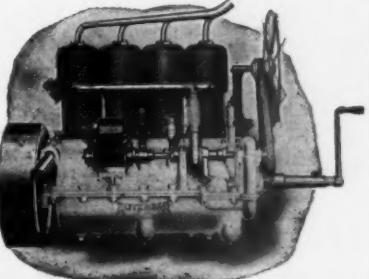
THE MOTOMETER COMPANY, INC.
1788 Broadway, N. Y.
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(View from Seat)

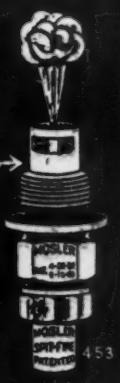
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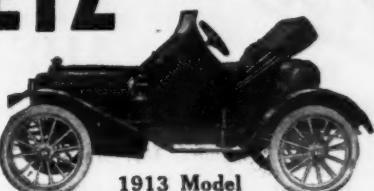
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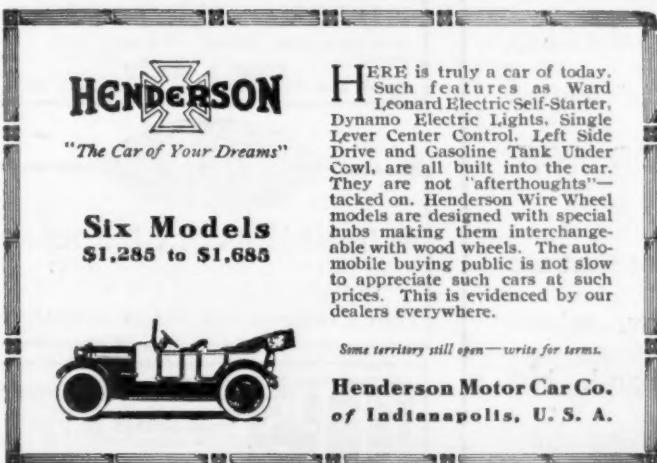
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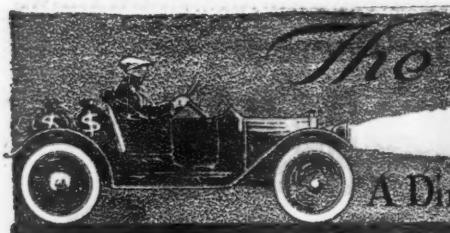
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All in good condition. Address, Lucia Bros. Motor Car Co., Green Bay, Wis.

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FOR SALE—ONE 1913, SEVEN-PASSENGER BIG SIX Lozier, used as demonstrator, run less than 5,000 miles; factory overhauled and repainted; looks as good as new; two spare tires, four spare rims; for \$4,000. One 1912 4-44 Pullman; run less than 500 miles; factory overhauled, new top, repainted, electric lights, self starter, spare tire; \$1,500. One 1911 Firestone Columbus in excellent shape, five-passenger; \$800. All cars f. o. b. Louisville. Louisville Lozier Company, 405 West Broadway, Louisville, Ky.

FOR SALE—WHITE STEAM CARS, VARIOUS models, in excellent condition; also parts for steamer engines and generators. We specialize in steamers. Joseph Libal, 3145-53 N. Halsted St., Chicago.

FOR SALE—4-PASSENGER TOY TONNEAU 1911 Moon "30." Repainted excellent condition.

H. S. Calnan, Clinton, Ia.

FOR SALE—5-PASSENGER WOOD'S electric car; splendid condition; will sell at big bargain. Apply

BEN WILLIAMS.

17 Arcade, Nashville, Tenn. Phone M 1825.

FOR SALE—1912 MODEL E. M. F. TOURING car, fully equipped and in good condition; run about 4,000 miles. Address W. L. Stayton, Mt. Carmel, Ill.

G. J. G.—SPECIAL RACING MACHINE capable of doing better than 70 miles per hour mounted on English style of wire wheels with Bosch racing magneto and motor modeled so as to have the minimum of friction to the maximum of speed. Equipped with New any make selected of standard tire equipment. Write for Photograph and specifications to; G. J. G. Motor Car Company, White Plains, N. Y.

MITCHELLS REBUILT, GUARANTEED. These cars are fully equipped. Call or write for further particulars.

Mitchell Automobile Co.
2334-36-38 Michigan Ave., Chicago.

ONE MODEL 38 OVERLAND 4 PASSENGER car; has doors; \$375.00; fine shape. H. Kaskel, Spencerville, Ohio.

ONE-TON MONITOR TRUCK; USED LESS than 3 months, covered body screened sides; new solid tires; a real bargain. The White Co., 2635 Wabash Ave., Chicago, Ill.

ONE 2-CYLINDER R. E. O. AND ONE 2-CYLINDER MACKENTYRE solid tire machine, which will sell cheap. Oberlin Machine & Garage Co., 93 S. Main St., Oberlin, Ohio.

TWO ONE-TON GRABOWSKY DELIVERY wagons in perfect condition; have just been completely overhauled; large panel body; will sell cheap, though only run about 10 months, as they are too large for our purposes. HEYN'S BAZAAR, 147-151 Woodward Ave., Detroit, Mich.

2 ELMORE TOURING CARS, MODEL 27 new; Model 26 used 180 miles, both fully equipped and warranted in perfect condition. Am going to move and must sell, prices very low. H. J. Daniels, Norwich, N. Y.

5 PASSENGER, 40 HORSEPOWER WINTON, 4-cylinder, motor 5 x 5. Good tires. Fine condition. Harold M. Richards, Cambridge, Ohio.

2-TON GRABOWSKY; IN GOOD CONDITION, equipped with furniture body and new tires all around. Will sacrifice if taken immediately. The White Co., 2635 Wabash Ave., Chicago, Ill.

3-TON 4-CYLINDER KELLY TRUCK, express body, cab over driver's seat. Will sacrifice if taken at once. The White Co., 2635 Wabash Ave., Chicago, Ill.

Parts and Accessories FOR SALE

A COMPLETE STOCK OF ONE AND TWO CYLINDER REO PARTS, which we offer at a discount of 40% from factory list on business amounting to \$20.00 or more. Address Box D 279, c/o Motor Age.

ATTENTION—HENRY OWNERS

Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars. Muskegon Automobile Co., Muskegon, Mich.

AUT-O-LITE STORAGE BATTERIES, 6-80; all makes, new and used; \$2.50 to \$9; guaranteed; get bulletin. 4105-7 Cottage Grove Ave., Chicago.

AUTOMOBILE OWNERS

Stop paying high prices for your accessories and supplies.

Tell me your needs and I will "show you."

B. JAY BARRIER,
First National Bank Building,
Cincinnati, Ohio.

AUTOMOBILE BODIES, PLEASURE AND COMMERCIAL.
Foredoors for open-front cars.
Write for prices.
Auto Specialty Mfg. Co., 326 E. Market St., Indianapolis, Ind.

AUTO OWNERS IN SMALL TOWNS.

You can save one-half your tire expense and nearly all your tire trouble by using Security Reliners. Many of our customers run their cars the entire season without blowout or puncture and without spending a cent for tire repairs.

YOU CAN DO IT YOURSELF.

If we have no dealer in your town you can get a trial order at the dealer's price, and make a good profit selling to your neighbors. If you run your own car write at once for our plan.

SECURITY RELINER CO.,
301 Spring St.,
Montgomery, N. Y.

AVOID ACCIDENTS—DIM-A-LIGHT. THE new device for controlling the glare of electric headlamps. Pellet's Magneto Exchange, 1463 Michigan Ave., Chicago, Ill.

A WHITE STEAMER GENERATOR AND burner, almost new. Will sell cheap. Address Box D 245 c/o Motor Age.

BODIES

At less than cost.

New fore-door touring bodies, \$45, \$55 and \$75. New Racy Runabout bodies, \$30, \$43 and \$50.

Jandorf Automobile Co.,
Body Dept.,
3-5-7 W. 61st St., New York City.

BLAZER EXHAUST HORNS FOR FORD cars. List, \$3.75. Good as the best; better than most. Fully guaranteed. Write today. Liberal discounts to dealers.

Motor Specialties Co.,
Box 16 Waltham, Mass.

BRAND NEW 35-40 H. P. FOUR CYLINDER motors, with fan, pump, clutch, magneto and coil. Price \$222.50. Not old, discontinued models, but up-to-date in every way. F. E. Alford, Goshen, Ind.

CUT-OUTS. E.M.F., Flanders, Buick, Regal, etc. Complete outfit with brass lock, open pedal, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

DETROIT FORE-DOORS

for

E-M-F, Ford and Hudson. One piece aluminum; immediate shipment subject to inspection. Detroit Fore-Door Co.

66 Fort St. E. Detroit, Mich.

DISCO SELF-STARTERS.

Only \$12.50. List price, \$30.00. Guaranteed. Only successful gas starter. Standard equipment on Stevens, Buick, Packard. Great opportunity to have 1913 improvement on your old car.

PARSONS SALES CO.,
1945 Grand Ave., Kansas City, Mo.

ELECTRIC HORN, \$3.00; \$6.60; STORAGE Batteries, \$7.50.

Fred Allen Auto Supply Co.,
1610 Michigan Ave., Chicago, Ill.

DRAGON REPAIR PARTS

We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

EVERY CAR OWNER SHOULD USE Electric Polishing Cloths. Keeps the New Car from Looking Old and Shabby and Makes the Old Car Look Like New. No. 1 cloth removes all spots and stains; No. 2 cloth gives a hard dry polish that will not gather dust. Saves half the time in washing. Price 50 cts. a set by Parcel Post. Order now.

A. & R. Co., Wallingford, Conn.

E. M. F. PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

FORD AGENTS—WE MAKE A SPECIALTY of Dust Hoods to cover top when clashed down, for Model T Ford 1910-1911-1912-1913 cars. Write for prices. Will save you money. The H. A. Hawes Storm Front Co., Coldwater, Mich.

FORD FAN BELTS, WOVEN COTTON AND silk; oulast six regular belts. Postpaid, 75c. Dealers, write. Angier's, Streator, Ill.

FORD LIGHTING OUTFIT \$5.50 Includes parabolic reflectors, tungsten bulbs, wiring, switch and free delivery. Truscott Auto Supply Co., St. Joseph, Mich.

FORD OWNERS

A postal brings you our 1912 catalog of 22 necessities for your car. Auto Parts Co., Providence, R. I.

FORD OWNERS AND DEALERS!

You will save trouble and money by installing our timer elevating device.

Ford Parts Specialty Co.,
1211 Main St., Richmond, Ind.

FORD OWNERS WANTING 5 ELECTRIC lights using Ford magneto for charging a storage battery (self contained system), write American Battery Co., 1124 Fulton St., Chicago.

FORD OWNERS—YOU CAN INCREASE the life of your tires 25% by fitting your car with Wire Wheels. Will also improve riding qualities of your car and make it up-to-date. Write Racine Auto Parts Co., Box 86, Racine Jct., Wis.

FORD OWNERS—OUR SPARE DEMOUNTABLE wheel cures tire trouble on road. Doctors attention. Write Angier's, Streator, Ill.

FORD, HUPP AND MAXWELL Muffler cut-out, machined ready to attach, including lock, open pedal string and cables, \$1.35. Lincoln Machine Shop, Lincoln, Ill. c

FORD OWNERS—WE CAN IMPROVE THE appearance of your Ford car 25% by adding to the top of the doors a set of mahogany moulding, stained to match the dash, at a very small cost to you. Write today for particulars. The Specialty Co., 2220 Calumet Ave., Chicago.



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Every week motorists find parts and accessory bargains in MOTOR AGE classified columns which prove of lasting benefit to their pocket-books.

Look for them.

FORD T. OWNERS

Foot throttle or accelerators, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

FORE-DOORS.

Doors made for all makes of cars. Guaranteed prompt shipment and a very good fit. We have patterns for most every car. F. E. Lortz Co., 2503 E. 55th St., Cleveland, Ohio.

GUARANTEED.

Radiators for all cars.

The following is our stock list of radiators for the cars mentioned, subject to immediate shipment. Compare our prices with other lists:

Ford Model "T"	\$18.00
Ford Model N-R-&S.	23.00
Buick 10-32-33-14	27.50
Buick F-16-17-19-26-27-28	35.00
Buick B-K-S-38-39	42.50
Hudson 20	33.00
Lion 40	30.00
Warren 40	25.00
E. M. F. 30	28.50
	30.00

Terms: One-third cash with order, balance C. O. D., or five per cent discount for cash with order.

Autoparts Manufacturing Co.,
Detroit, Mich.

GUARANTEED BATTERIES.

6 volt 140 Amperes.....	\$16.00
6 volt 80 Amperes.....	13.00
6 volt 60 Amperes.....	10.00

The Ampvo Battery Co.,
1607 Michigan Ave., Chicago, Ill.

HUPP OWNERS.

Write for our parts list; save you time on repair parts.

Autoparts Mfg. Co.,
Cor. Trombley and Orleans,
Detroit, Mich.

IS THE FINISH ON YOUR CAR DULL?

Apply Boyer's Automatic Re-Finisher to your Automobile today. Tomorrow it will look as though it just came from the factory. Finest thing in the world for dull hoods. One application lasts a year.

Particulars free.

Boyer Chemical Laboratory Co.,
2 E. Michigan St., Chicago.

KASTNER TIRE AND RIM CO.

2112 Michigan Ave., Chicago. Standard Universal, quick detachable rims in sizes 30x3, 34x3½, 32x4, at \$5.00 a set of four, absolutely new. Also 30-3 one-piece clincher rims at 50 cents each. Send for cut of quick detachable rim and our new rims part catalogue.

KEROSENE FOR AUTOMOBILES.

Our new Model B uses successfully half and half mixture lowest grades kerosene and gasoline. Satisfaction guaranteed or money refunded. Greatly increased power; very slow speed on high. Starts easy at zero. Special agents' prices. Dept. B. The Air-Friction Carburetor Co., Dayton, Ohio.

LATEST FORD TOURING CAR BODY, \$90.00. Latest Ford roadster body, \$35.00. Tops, curtains included. Mac Innis Bros., Toledo, Ohio.

LAUGH AT TIRE TROUBLE

Use Standard Tire Protectors. Tire expense reduced two-thirds. Write today for our valuable accessory catalogue.

New York & Brooklyn Auto Supply Co.,
1717-1719 Broadway, New York.

LIGHT — DO YOU USE ACETYLENE lights? Are they troublesome? Is the light produced yellow and dim? We guarantee a White Light Gas Refiner to remedy it or refund money. Price \$1.50. Barnard Brass Works, Rockford, Ill.

MACHINE SHOPS AND GARAGE—OUR WELD IT ALL machines will weld perfectly any broken casting that has a melting point. Full particulars on Oxy-Acetylene welding machines sent on receipt of your address. Every machine fully guaranteed. H. D. Prose & Co., Wichita, Kansas.

MAKE YOUR CAR RIDE EASIER AND prevent squeaking. Our tool for lubricating makes the springs over 50 per cent more pliable and resilient. Price, post paid, \$1.50. Send for descriptive circular.

Spring Leaf Lubricator Co.,
Dept. B, Ann Arbor, Mich.

MANUFACTURERS' SALE

50% OFF PURCHASE PRICE.

60 New Ejector Mufflers, each..... \$ 2.50
Frames 112" and 124" W. B., Straight and Kickup \$12.00 to \$15.00
Frames, unassembled, 112" W. B., Kickup 10.00

Wheels, 32 x 3½-34 x 3½, etc., per set \$10.00 to \$15.00
Axles, front and rear, 30 to 50 H. P. 5 Pass Bodies, rough and leaded, not upholstered \$ 10.00 to \$ 15.00

Atwater Kent systems, Broadcloth, odd trimmings, garage flash sign, showcase, running board brackets, spring hangers, starting cranks, rough flywheels, drive shafts, a few auto tops, etc.

Ask us for Particulars.
Address,
Box D 364 c/o Motor Age.

MAXWELL PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

MORA REPAIR PARTS

We purchased the repair business of the Mora Company and have in stock repair parts for all models of Mora cars. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

MR. (FORD) OWNER AND GARAGE MAN

The Townsman Valve Adjuster has a cushion for your valve-stems. Takes away the click, absolutely silencing the valves. No screws or burrs to work loose. Saves putting in new push-rods and valve-stems. They never wear out. Price \$1.50 by mail. Ask your jobber, or address Townsman Auto Specialty Co., Mitchell, S. D.

MR. FORD OWNER AND MR. FORD

dealer, drop us a line for our 1913 list of Ford specialties. The K. & S. Specialty Co., 1777 Broadway, New York City, N. Y.

NICKEL PLATE YOUR AUTO TRIMMINGS

With Electro-Nickel. Prevents brass from tarnishing, iron from rusting. This is not a silver or mercury wash. We guarantee it plates (without a battery). Price \$1.00, express prepaid. Write for information. Gun Metal Finish Co., 313 Powers Block, Decatur, Ill.

OXY - ACETYLENE WELDING PLANTS.

The Admiral Welding Machine is the ideal welding device; large capacity; self-generating throughout; portable; complete in every detail; a perfect machine for all work, large or small. Send for our booklet, "Welding," and full description. Price, \$200 f. o. b. Kansas City. Admiral Mfg. Co., 715 Lydia Ave., Kansas City, Mo.

PEERLESS BACK & CUSHION DRESSING.

For leather seats and cushions. Dries hard on clean leather. The color does not come off. Renews the finish. Ask your dealer.

The Columbus Varnish Co., Columbus, Ohio.

PENNANTS FOR AUTOMOBILES MADE

In rights and lefts from any colored felt desired; size 12x30. Price \$1.00 per pair. Cash with order. Liberal discount to dealers. J. C. Orcutt Co., Inc., Lincoln, Neb.

PEERLESS EXTRA FINE BLACK BAKING JAPAN.

For baking on all metals, no primer, one coat covering solid. Bakes to a high gloss in 2 to 3 hours. Can also bake to a semi-gloss and dull finish. Ask your dealer. The Columbus Varnish Co., Columbus, Ohio.

PRICES THAT TALK.

Flanders "20" tops	\$13.50
Carburetors 1 1/4" (Mayer or Holley)	3.50
Barnes Steering Gears	10.00
Splitdorf magnetos and coil	20.00
Trunks (size 31x17x12)	4.00
Side lamps (black and brass) per pair	3.50
E. M. F. Springs (rear)	2.50
Universal joints 1/4"	5.00
16" ball bearing fans	2.25
12" ball bearing fans	1.50
Hyatt roller bearings (all sizes)	1.50
Head-light brackets 7" span...a pair	50

Write for our new bargain sheets.

Auto Parts Mfg. Co., Detroit, Mich.

PEERLESS EXTRA FINE BLACK JAPAN.

For all metal, lamps, radiators, fenders, etc. Air dries in 10 to 12 hours with a high gloss finish. Elastic, tough, durable; no primer; one coat covers solid. Ask your dealer.

The Columbus Varnish Co., Columbus, Ohio.

REZINOBRACED.

A CARBON REMOVER, NO FAKE. SEND ONE DOLLAR FOR FORMULA. REZINOBRACED, BOX 34 PLATTEVILLE, WIS.

RADIATORS—NEW GUARANTEED GOODS

Ford, Model T	\$16
Buick Model 10	22
Buick Model F	25
Chalmers-Detroit	20
Everett	20
Stoddard-Dayton	25

Any other make required at equally low prices.

Times Square Automobile Co., 1210-1212 Michigan Ave., Chicago.

REPAINT YOUR CAR YOURSELF—WITH our materials and full instructions, you can repaint your car as well as a regular painter and save from \$25 to \$50, depending on its size. Previous experience unnecessary. Latest colors. Write today for full information and color cards. We also make Liquid Gun Metal, the National Brass Enamel. \$1 a can, express prepaid. The only articles of proven merit for lamps, radiators, etc. No polishing. Arsenal Varnish Co., Automobile Dept., Rock Island, Ill.

SCHEBLER MODEL "L" CARBURETORS, new, 1 1/4 or 1 1/2-inch, \$8.00 each. Order early. Kent Motor Car Co., Kenosha, Wis.

SEAT COVERS FOR ALL CARS—SPECIAL price on Fords. We clean old covers; make them look like new. Auto Cape Top Co., 2334 Michigan Ave., Chicago.

SIX CYL. CONTINENTAL MOTOR, \$325.00

Six cylinder Beaver motor.....\$300.00

Four cylinder Continental Unit Power Plant.....290.00

Timken I-Beam front axle.....22.00

Timken rear axle.....72.00

For other bargains send for our Bargain Sheet No. 700 and 200-page catalogue No. 6.

AUTO PARTS CO..

513-31 Jackson Blvd.,

CHICAGO, ILL.

STEVENS AUTO TIRE VALVE

Adopted by Ralph De Palma, winner of the Vanderbilt Cup at Milwaukee, 1912. Can be attached instantly without any expense to any inner tube stem on any car. Saves one-half the time and labor necessary to inflate tires by any other method. Easily adjusted. Warranted not to leak. 200,000 in use. Send \$1.00 for set of four. Try them 30 days and if not satisfactory money will be cheerfully refunded. Stevens Manufacturing & Supply Co., 504 Fisher Bldg., Chicago.

TIRE FLUID "GOO GOO" TIRE FLUID

Closes punctures in Auto Tubes. I will furnish receipt for compounding two kinds. Two \$5.00 or one \$3.00. Make 10 gallons for what you pay for two.

Money refunded if not satisfactory.

W. J. SNOOK,
1041 School St., Des Moines, Ia.

TOPS BUILT, RECOVERED AND RE-paired.

C. G. Meyer & Son, Tiffin, Ohio.

TOURING, ROADSTER, RACING BODIES.

Seats, special and stock sizes. Radiators, hoods, tanks and fenders for any car. Get our prices.

Auto Sheet Metal Works,
2228 Michigan Ave., Chicago.

YOU CAN TURN OLD BRASS ON YOUR automobile into beautiful, lasting, shining silver plate, easily and quickly, with Orient "Mystic" Silver Plater; to introduce to every automobile owner quickly, we will send, prepaid, "concentrate" to make quart of this wonderful plater for \$1, which in bulk costs \$4; satisfaction guaranteed or money back. Orient Chemical Co., 467 Gumbel Bldg., Kansas City, Mo.

1 1/4" D NO. 3 RAYFIELD CARBURETOR

\$10.00.

1 H. T. Elsemann magneto.....\$ 25.00

1 National L. T. magneto.....15.00

1 B No. 3 Stromberg carburetor.....9.00

1 Model 2 H. T. Bosch magneto.....15.00

1 35 h. p., 4-cyl. Northway motor....100.00

1 Milwaukee, 4-cyl. motor, like new....125.00

Auto Salvage & Parts House,

1436 Wabash Ave.

Chicago.

UNEQUALED PRICES.

NEW ENGINES.

3 cylinder Reliance, 45 h. p.....\$100.00

4 cylinder Reliance, 60 h. p.....125.00

2 cylinder Delahaye vertical, 14 h. p. 60.00

4 cylinder Mora, 20 h. p.....125.00

4 cylinder Maxwell, 20 h. p.....200.00

4 cylinder Chester, 25 h. p.....175.00

4 cylinder Buda, 35 h. p.....200.00

4 cylinder Poss, 25 h. p.....135.00

4 cylinder Welsh, 60 h. p. racing motor 300.00

6 cylinder Herschel-Spellman, 45 h. p. 350.00

2 cylinder opposed unit power plant.. \$5.00

SELF STARTERS.

Disco self starters for 4 and 6 cyl.; regular price \$50; our price, while they last; each.....\$ 7.50

AUTOMOBILE TOPS.

Regular silk mohair tops, side curtains and boots; 5 and 7 passenger; sold everywhere at \$75; our price 30.00

Price includes fitting.

BODIES.

Our E body; handsome straight line, flush side, five-passenger body, trimmed in highest grade of leather, and upholstered and painted and varnished; ready to set on your car; 34" wide and 94" long. Regular price \$350.00. Our price \$100.00.

Our 7-passenger body of equal quality and latest design; painted in the lead; 35" wide and 106" long. Regular price \$500.00. Our price \$125.00

A few handsomely trimmed and painted Colonial Coupe bodies. Regular price \$800.00. Our price \$300.00

DELIVERY WAGON BODIES.

We have the handsomest panel delivery wagon bodies in Chicago. Cost \$250.00 at least to manufacture. Price \$40.00 each.

AXLES.

Weston-Mott semi-floating axles complete with hubs, \$40.00 per set. Timken full floating axles complete with hubs, \$70.00 per set.

WHEELS.

All sizes in stock, \$12.00 per set.

GASOLINE TANKS.

Round, 20 gallon gasoline tanks, \$5.00 each.

WIND SHIELDS.

All kinds and sizes of automatic wind-shields from \$5.00 to \$15.00 each.

HORNS.

Electric vibrator horns, strong full tone, \$4.75. Motor driven horns, \$6.50.

CARBURETORS.

Many different makes; prices range from \$2.50 each to \$12.50 each.

Rear Axles—Weston-Mott geared 4 to 1; complete with wheels. Regular price, \$120.00. Our price, \$35.00.

Steering Column—Complete; \$15.00 each.

Large auto trunks, \$6.50 each. Trunk racks, \$1.50 each.

TOPS.

All makes of tops. Roadster tops from \$10 to \$15 each. Touring car tops from \$18 to \$35 each.

WIND SHIELDS.

One piece roadster shields. Regular price, \$25.00. Our price, \$12.50 each.

All brass folding wind shields, \$8.00 to \$15.00 each.

RADIATORS.

See our special ad under radiator classification—at the top of the center column on this page.

MAGNETOS.

Bosch DU4 magnetos \$35.00

Bosch D6 magnetos 40.00

Splitdorf dual system magnetos 25.00

Volta high tension magneto 15.00

J & B 1 cylinder, high tension 6.50

Splitdorf 2 cylinder; complete; \$15.00 each.

Splitdorf 4 cylinder; complete; 25.00 each.

Splitdorf 6 cylinder; complete; \$30.00 each.

Simms-Bosch high tension; complete; \$25.00 each.

Remy 4 cylinder; complete; \$25.00 each.

Jacobson-Brandon 1 cylinder, \$6.50 each.

TIRES.

Write for catalog and circulars with prices.

SPEEDOMETERS.

"Standard" high grade instruments, regularly sold for \$25.00. Our price \$6.50. We have them only for 34 and 36 inch wheels.

LAMPS.

We carry a full line of side oil lamps and gas headlights. They consist of jobs that we pick up at the different automobile factories and include some of the best makes.

Side Lamps—Prices from \$2.75 to \$5.00 a pair.

Head Lights—Prices from \$5.00 to \$15.00 a pair.

Tail Lights—Prices from \$2.00 to \$3.50 each.

PRESTO TANKS.

We have just secured a job lot of model "B" tanks filled and complete with brackets. Regular price \$25.00. Our price \$13.50 each.

TIMES SQUARE AUTOMOBILE CO., 1210-1212 MICHIGAN AVE., CHICAGO.

S. W. Cor. 56th and Broadway, New York City.

When Writing to Advertisers, Please Mention Motor Age.

\$17.50 — RAYFIELD CARBURETORS, model D-3, 1 1/4" vertical intake, brand new. Only a few on hand; \$3.00 — Kingston carburetors, 1 1/4" vertical intake, brand new; \$14.00 — New Warner steering gears, complete with 18" steering wheel, spark and throttle levers, etc. Other great bargains. Automobile Appliance Co., 1714 Michigan Ave., Chicago, Ill.

\$20 FORE-DOOR, FOUR PASSENGER BODY, untrimmed. Send for photographs. \$18 roadster seats, double bucket upholstered. Automobile Appliance Company, 1712 Michigan Ave., Chicago.

Cars Wanted

WANT 6-CYLINDER CAR IN EXCHANGE for 640 acres unimproved Hutchinson County, Texas land; 200 acres river bottom land; balance grazing. B. E. Miller, Independence, Kas.

WANTED—1912 AUTO IN EXCHANGE for 160 acres of good Minnesota land. Address Box 414, Marshalltown, Iowa.

WILL TRADE BRAND NEW \$350 PIANO and cash for 1912 Ford touring car. Box D 374, c/o Motor Age.

60 ACRES WILD LAND PERKINS COUNTY, S. D. Mortgage \$200.00. Want 1912 auto for equity. Box 209, Marshalltown, Iowa.

Ball Bearings

BALL & ROLLER BEARINGS, ALL TYPES Distributors of "F & S" Ball Bearings, "New Departure" Ball Bearings, "Pressed Steel" Ball Bearings, "Standard" Ball and Roller Bearings. **BALL BEARINGS REPAIRED.** THE GWILLIAM COMPANY, New York—Broadway, at 58th St. Philadelphia—1314 Arch St.

Situations Wanted

AUTOMOBILE BODY DESIGNER AND general foreman of many years' experience desires a position with reliable firm. Address, Box D 356 c/o Motor Age.

CHAUFFEUR, COMPETENT MAN, CARE-ful driver, wishes position; references. McIntrye, 1,727 Park av., New York.

CHAUFFEUR, PRIVATE, EXPERT ON all repairs; Lozier preferred; six years' private reference; factory experience. F. B. Lewis, 200 Columbus ave., Boston, Mass.

ENGINEER HAS HAD 8 YEARS' EXPERI-ence in the design of pleasure and commercial cars. Is open for engagement. Box D 341, c/o Motor Age.

I WANT TO CONNECT WITH SOME GOOD square firm, as branch manager, road salesman or sales manager. Salary and commission or a percent of the profits. Six years' experience selling automobiles. Address, Box D 357 c/o Motor Age.

SALESMAN OF EIGHT YEARS OF EXPERI-ence and of wide acquaintance desires to make connection with a live firm where experience and hard work will be appreciated. Until recently was employed by firm manufacturing medium-priced car as assistant sales manager. Had best of reason for leaving their employ.

Can furnish best of references as to my ability and reliability. Address Box D 337, c/o Motor Age.

TRUCK ENGINEER, WITH CONSIDER-able experience, would consider a change. Address Box D 328, c/o Motor Age.

WANTED—A POSITION AS CHAUFFEUR in private family; Boston Tech. education; experienced in the care and driving of high-class cars. Best of reference. R. C. Brett, 21 Inman Street, Cambridge, Mass.

YOUNG MAN 21 YEARS OLD, DESIRES position in garage; have 3 years' factory and garage experience; will be ready to commence work immediately; no bad habits. H. A. Schuldt, Box 231, Des Moines, Ia., H. P. C.

Help Wanted

ENGINEERS, SUPERINTENDENTS, Works Managers, Designers, Production and Efficiency Engineers, and Draftsmen with automobile experience. Inquiries confidential; record must stand investigation when desired. The Engineering Agency, Inc.—29th Year—Chicago.

WANTED—SHOP FOREMAN WITH AT least three years' experience on Ford cars and capable of handling men. No smoking or drinking permitted. None but high class men need apply; state wages expected. Address W. E. Groendyke, Amarillo, Texas.

WANTED—50 HIGH GRADE MEN Managers, Engineers, Superintendents, and Draftsmen with Automobile Experience. The Toledo Engineering Agency, 1228 Ohio Bldg., Toledo, Ohio.

Salesmen Wanted

SALESMAN WANTED.

One who is now calling on Automobile Jobbers or Dealers to sell an advertised automobile accessory. Only a first class man considered. Give reference and territory now covered. Address C. W. Meyrick, 2431 Vine St., Kansas City, Mo.



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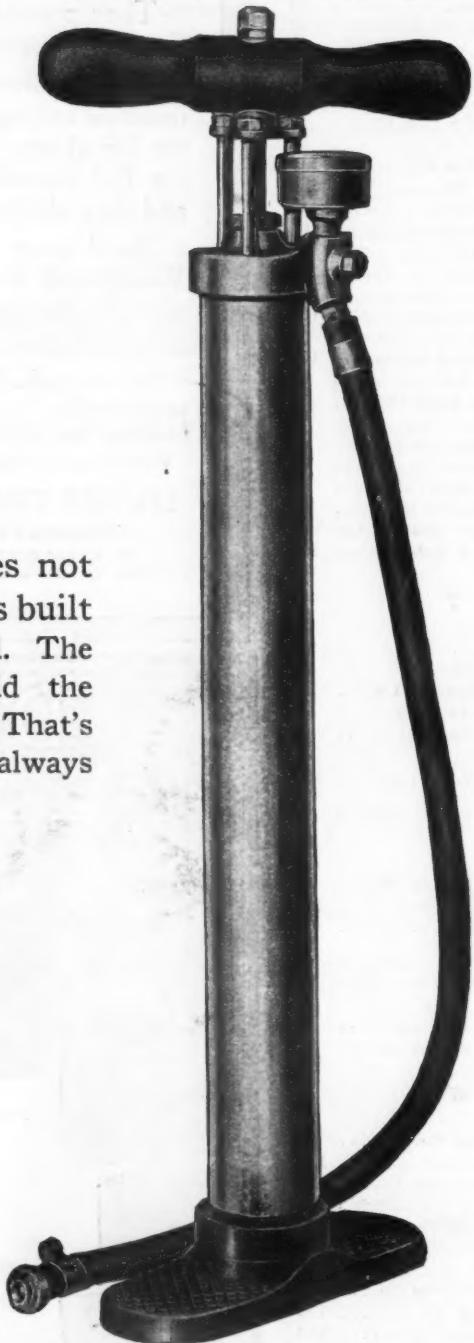
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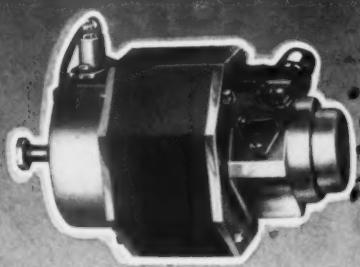
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Bridgeport Brass Company

P. O. Station A

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This price includes generator, wiring, harness, 60-ampere hour storage battery and all controlling switches ready for installation. Price f.o.b. Grand Rapids.

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The critical public is beginning to discover the weak spots in systems built on faulty principles of electrical engineering. All such systems are bound sooner or later to give endless trouble—and the blame will fall on the makers of the cars that use them.

Who wants to jeopardize his 1914 production with an uncertain electric lighting and starting system?

There is no need to take a second best when you can have the Ward Leonard system. Electrical engineers endorse its scientific principles of operation, and the name "Ward Leonard" insures its faultless construction.

The Ward Leonard lighting and starting system will be standard equipment in 1914 on many makes of cars—both American and European. It is already used by eleven makers.

It will not only help the sale of every car so equipped, but, what is most important to the car maker, it will make every owner an enthusiastic booster of the car. The reason is simple; the Ward Leonard lighting and starting system is 100 per cent. efficient.

A critical public will be satisfied with nothing less.

WARD LEONARD ELECTRIC COMPANY
BRONXVILLE NEW YORK

Lighting & Starting System

